

The Social Ecological Model and Infant Mortality in Franklin County, Ohio and Tokyo, Japan

Honors Research Thesis

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II. EXECUTIVE SUMMARY

This paper explores the causes, risk factors, and protective mechanisms behind infant mortality through a cross-cultural examination between Franklin County, Ohio and Tokyo, Japan. It does so through the systems theory known as the social ecological model that consists of five succeeding levels: individual, interpersonal, organizational, community, and policy. Each of these levels represents specific facets and components of both societies and how they may relate, either positively or negatively, to infant mortality. It begins with overviews of both the social ecological model and infant mortality, before transitioning into a review of the demographics and population in Tokyo and Franklin County and concluding with country-specific analyses at each framework level of the social ecological model.

The third chapter takes an in-depth look at the social ecological model and how it can be applied to matters of public health. The fourth and fifth chapters examine demographic, economic, and social characteristics of Tokyo, Japan, and Franklin County, Ohio, respectively. The sixth chapter offers an overview of infant mortality as a metric of health and a tool used in policy and legislation; the seventh chapter explores infant mortality in Franklin County, specifically. The succeeding eighth chapter looks at significant individual level data, patterns, and factors as they apply to the infant and the mother in Franklin County. One can find information on interpersonal level factors in the ninth chapter and organizational level statistics and trends in the tenth chapter. The eleventh chapter explores organizations, task forces, and other societal institutions in Franklin County and their work as it applies to infant mortality and other infant health outcomes. The twelfth chapter includes recent policy decisions, legislation, and the execution of these infant mortality-related conclusions in Franklin County. The thirteenth chapter explores infant mortality as an institution in Tokyo, Japan. The succeeding chapters adopt the same pattern as chapters eight through twelve in Franklin County, by exploring individual level (chapter fourteen), interpersonal level (chapter fifteen), organizational level (chapter sixteen), community level (chapter seventeen), and policy level (chapter eighteen) data, institutions, trends, and decisions as they apply to infant mortality in Tokyo. Finally, the nineteenth chapter serves as a conclusion to this thesis and offers seven total recommendations (five to Franklin County and two to Tokyo) for public health officials, government employees, task forces, and other societal institutions in each respective city.

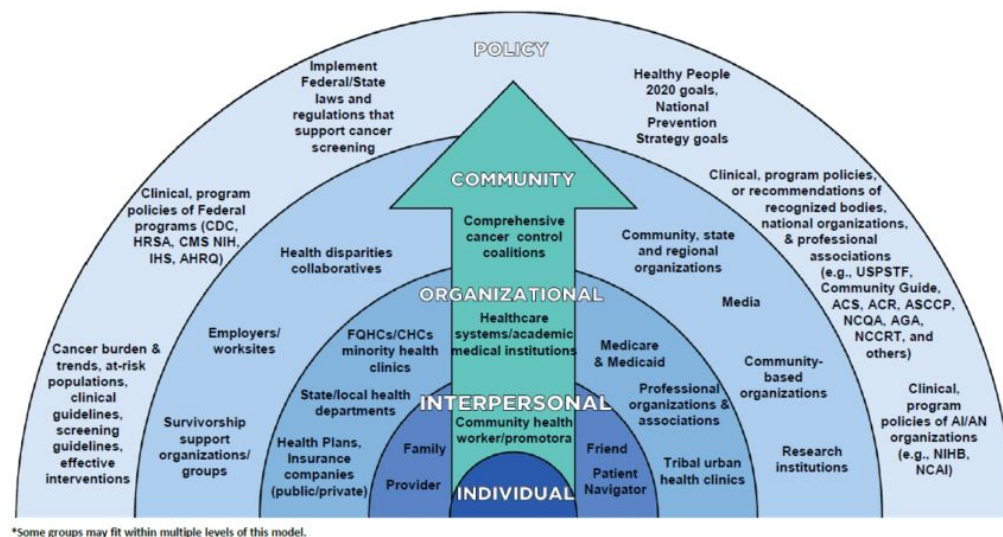
Referring to each region as Franklin County or Columbus was dependent on the literature utilized in that section; they were also used interchangeably at times if the research was derived from more generalized regions, such as the state of Ohio or the United States, and synthesized down to the city or county.

Likewise, Tokyo was used for city-specific information and Japan was used if the text came from national

sources, like governmental ministries or data from international studies or organizations. Research was conducted through a review and consolidation of scientific studies, scholarly literature, reviews of current maternal and child health and other public health institutions, and cultural or travel websites to synthesize this thesis as a integrated infant mortality assessment.

III. SOCIAL ECOLOGICAL MODEL

The social ecological model is primarily a multi-level, systems theory framework for analyzing and understanding social systems and interactions between individuals and environments. It is “a framework for understanding how individuals and their social environments mutually affect each other across the lifespan...[and] the factors that produce and maintain health and health-related issues, allowing identification of promising points of intervention and understanding how social problems are produced and sustained within and across the various subsystems” (Wendel et al.). It was applied to epidemiology in 1996 by Mervyn Susser and Ezra Susser and in 2005, Urie Bronfenbrenner fit the model to its current design as and within a systems theory (Wendel et al.). The model follows a systems theory format, in which the individual is the core and concentric circles representing interpersonal factors, organizational factors, community factors, and policy factors as levels of influence. These five levels refer to the public health and social institutions that function at these levels to maximize the synergy of intervention to create the greatest impact.



Structural depiction of the social ecological model as published by the Centers for Disease Control and Prevention, describing a cancer coalition and national-level response.

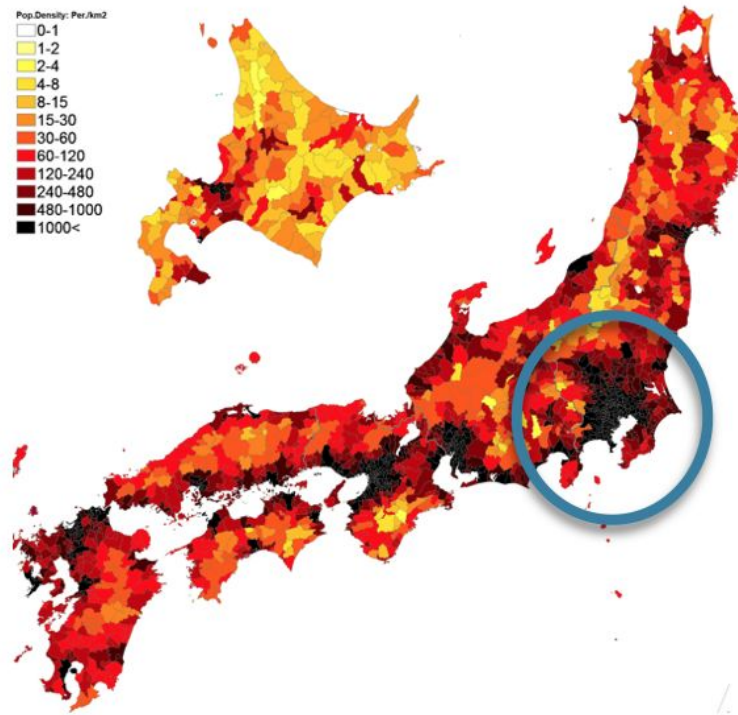
The model reflects the interrelatedness of each of the five factors and acknowledges the complexity of these systems and the overall model. The individual is the body to which information and interventions will be most acutely funneled and distilled towards. Characteristics of this individual influence behavior

change and includes knowledge, attitudes, self-efficacy, racial and ethnic identity, religious background, economic status, literacy and fluency, expectations of social institutions and behaviors, and stigmas. The interpersonal level is “intended to facilitate individual behavior change by affecting social and cultural norms and overcoming individual-level barriers” within social networks and social support systems (Centers for Disease Control and Prevention). Friends, family, coworkers, peers, healthcare providers, community health workers, patient navigators, and religious networks and traditions are included in this level. Organizational factors follow interpersonal components and include the influence of organizational systems and policies, as this level represents institutions with rules and regulations for operations that affect how services are provided to and employed by human populations. It comprises of healthcare systems, employers, healthcare plans, local health departments, tribal and cultural health clinics, workplace policies, and professional organizations. Particularly with health, one can perceive the feedback loops as they exist with providers and patients. The fourth component represents community factors as the leverage of resources and participation or membership in community institutions and the relationships among organizations, institutions, and networks within defined boundaries, incorporating disease support groups or coalitions, tribal health departments, advocacy groups, community leaders, public awareness, educational campaigns, the promotion of resources, built environments, and transportation systems. Finally, the outermost element is the policy level or the interpretation, redefinition, and implementation of federal, state, and local health-related policy that are especially pertinent to healthcare, including restrictive policies, access to healthcare services, or the lack of policy altogether; it also refers to the communication and liaising of policy decisions to the public.

IV. TOKYO OVERVIEW

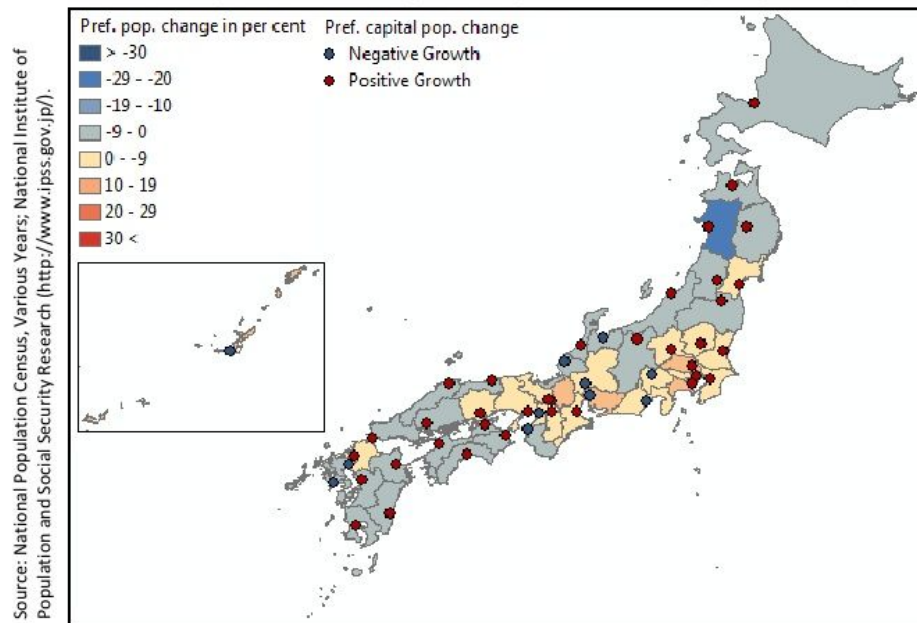
Population Distribution and Change

In Japan, 91.9% of the population lives in urban or metropolitan areas (UNICEF) -- compared to only 80.7% of the United States population and 77.9% of the population in Ohio (U.S. Census Bureau). Tokyo is the most densely populated region in Japan and there are an estimated 6,158 people per square kilometer with about 11% of Japan’s total population, roughly 13.49 million people, living in Tokyo. Approximately 440,000 of this population are foreign residents. However, Tokyo is only 0.6% of the total area of the island country, while it maintains the largest and densest population of all prefectures (Ministry of Internal Affairs and Communication Statistics Division).



2017 density of the different prefectures in Japan; the indicated area is Tokyo (Population Density Maps).

The overall population of Japan is declining due to a low national birth rate and the extensive out-migration trend exceeding in-migration. However, Tokyo is one of the few prefectures with positive population change (National Institute of Japanese Studies, University of Duisburg-Essen); in 2014, an estimated 405,000 people moved into Tokyo and about 331,000 people emigrated from the region (Bureau of General Affairs). The Japanese birth rate is 1.46 births per woman (Ministry of Internal Affairs and Communication Statistics Division), which is significantly lower than the established threshold birth rate of 2.1 births per woman, which is the minimum replacement rate necessary to maintain a population's current level.



Tokyo is one of the few prefectures marked with a positive population change (National Institute of Japanese Studies, University of Duisburg-Essen).

Race and Ethnicity Indicators

The World Atlas writes that “Japan has one of the most culturally homogeneous major societies... dominated by the Yamato people.” This term was first introduced in the late 1800s to distinguish mainland communities from distant ones on the more isolated islands. The World Atlas continues, “the Yamato Japanese have ruled every major dynasty, kingdom, and period in Japanese history, and are the quintessential group that one thinks of when thinking of Japan.” Currently, 98% of the Japanese population self-identifies as Yamato; the Ryukyuan Japanese are the next largest group and were originally a community on the Ryukyu archipelago between China and Japan (Tokyo City Guide: Tokyo People). The Ryukyuan language dialect is one of the two major variations within the Japonic language family. The remaining 2% of the Japanese population consists of Koreans, Chinese, Filipinos, Latin Americans (mainly Brazilians and Peruvians), British, and Americans. Many Japanese, specifically the Yamato Japanese, are actually found to be of a mixed heritage between the Ainu, the Jomon, and the Yayoi. The Ainu are an aboriginal people of Japan, the Jomon migrated from North and Central Asia several thousand years ago, and the Yayoi migrated from the southern part of the Korean Peninsula around 350 BCE (Tokyo People).

Age and Life Expectancy Indicators

Approximately 11.4% of the total population in Tokyo, 1.477 million individuals, are children below the age of fourteen. 58.2% of the total population, approximately 8.85 million people, are of a working age, which is defined as between the ages of fifteen and 64; of this, 6.013 million were employed and 375,000 were fully unemployed -- the difference consisted of students, underemployed, or unknown. The United Nations standard establishes an aged society as one in which 14% of the total population exceeds 65 years of age and a super-aged society as a population with nearly 21% over this age cut-off: currently, 20.4% of the Tokyo population (2.42 million individuals) are elderly (Ministry of Internal Affairs and Communication, Statistics Division). The life expectancy in Japan is the highest in the world: 79.94 for males and 86.41 for females (National Institute of Population and Social Security Research).

Economic Indicators

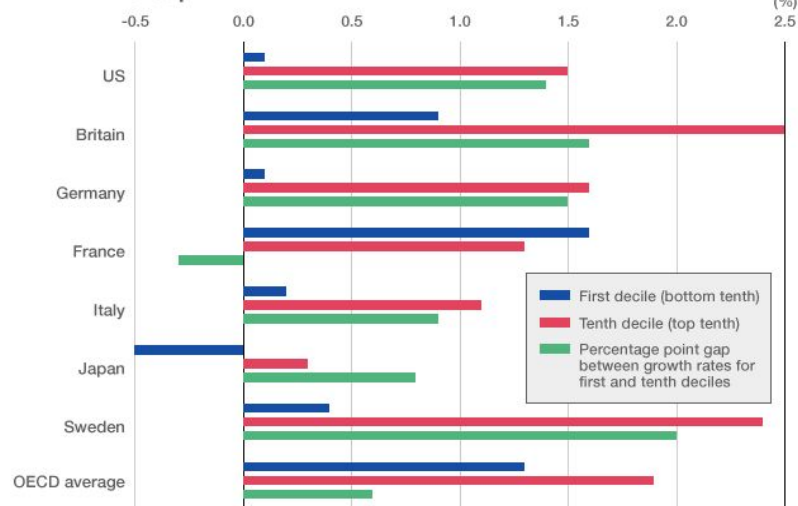
Tokyo is one of the richest cities in the world with an estimated total GDP of \$1.9 billion (World Population Review); for comparison, the Columbus metropolitan area in Ohio had an estimated total GDP of \$130.8 million in 2016 (Federal Reserve Bank of St. Louis). The three central wards of Tokyo -- Chiyoda, Chuo, and Minato -- are the wealthiest, while the wards in the northern and northwestern area are comparatively poor (Ministry of Internal Affairs and Communication).



Wards in Tokyo with major neighborhoods and municipalities labeled (TokyoMap).

Tokyo's society is gradually becoming more unequal, although the objective percentage gap between growth rates for the outlier deciles is relatively small when compared to other Organization for Economic Cooperation and Development (OECD) countries. Japan is the only OECD country in which the real income of the bottom has contracted at an average annual rate of 0.5%, though the gap between rich and poor in most countries is also widening (Kohei).

Figure 1 Average Annual Change in Real Household Income by Income Group



Source: OECD, *Divided We Stand: Why Inequality Keeps Rising*, 2011.

nippon.com

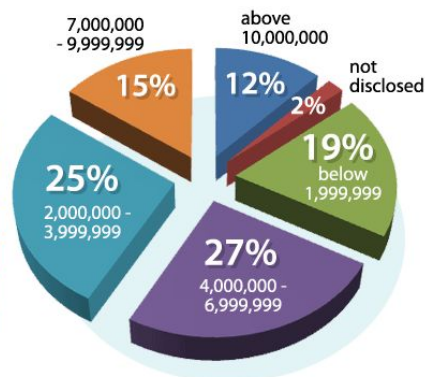
Average annual changes in household incomes for income groups in Japan and other OECD members (Kohei).

The share of income that the top 5% maintains increased rapidly between the 1990s and 2015; they currently maintain control over an estimated 25% of the gross pre-tax income. This proportion is lower than the United States and Britain (with an approximate 35% and 30%, respectively), but is still substantially higher than France, with 21% of the income going to the top 5%, or Sweden (17%) (Kohei).

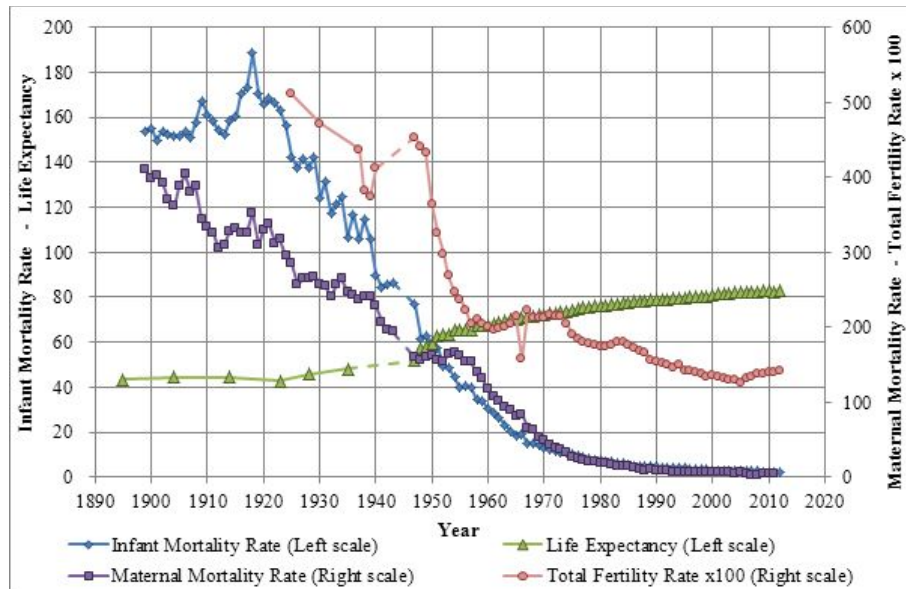
Annual Household Income

Annual Household Income (Yen)	No. of Households (Thousand)	%
-1,999,999	9,495	19
2,000,000 - 3,999,999	12,369	25
4,000,000 - 6,999,999	13,296	27
7,000,000 - 9,999,999	7,461	15
10,000,000 +	5,906	12
not disclosed	1,078	2
Total	49,605	100

* Source: Japan National Survey of Family Income & Expenditure 2007



Average household incomes for Japan with the proportion of the population each quintile represents.

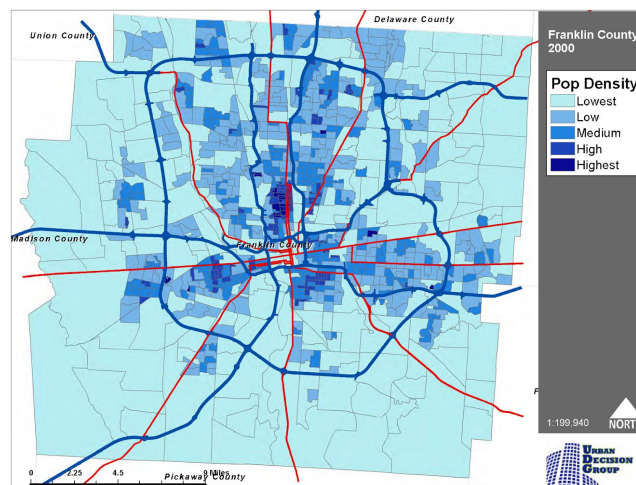


Mortality and fertility rates and life expectancy for Japan from 1890 to 2020 (National Institute of Population and Social Security Research).

V. FRANKLIN COUNTY OVERVIEW

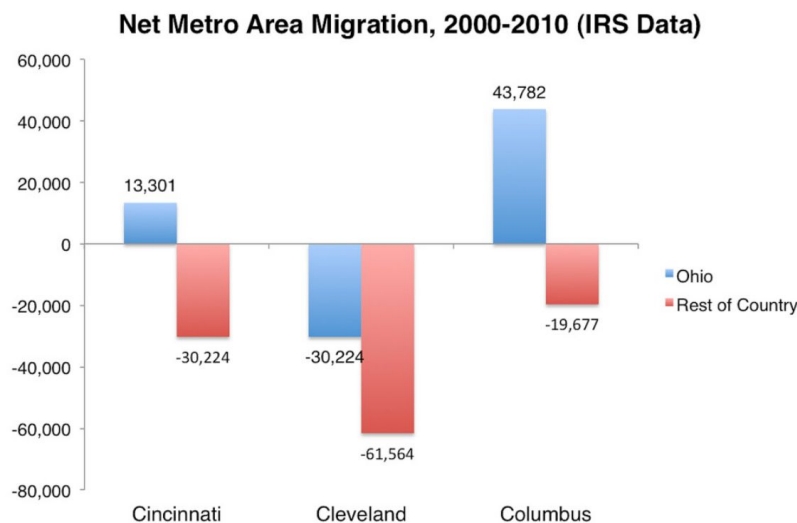
Population Distribution and Change

In 2016, 860,090 people lived within Columbus city limits, while 1.252 million people lived in Franklin County (U.S. Census Bureau). According to Data USA, there has been a 1.6% population growth rate in Columbus from 2015 to 2016.



Population density of Franklin County in 2000; the major dark area in the center of the county is The Ohio State University.

Aaron Renn, a senior fellow at the Manhattan Institute for Policy Research, has examined in- and out-migration to and from Columbus, Ohio.

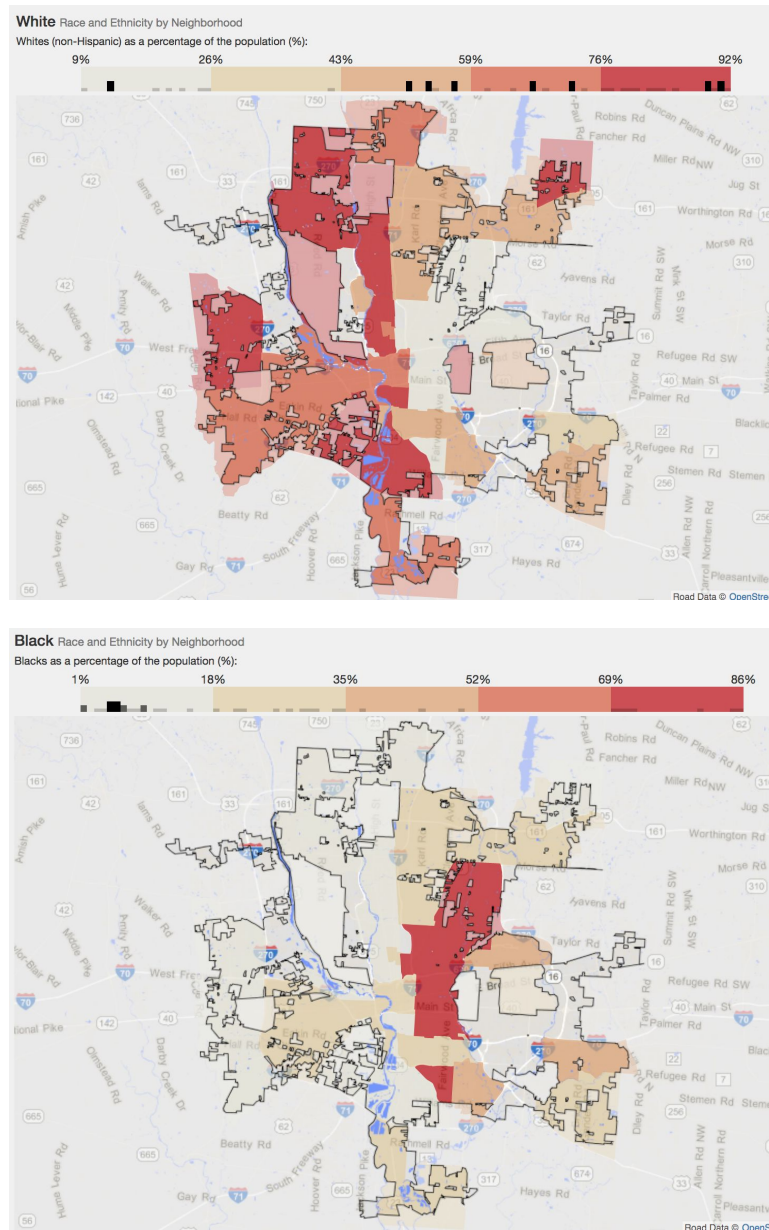


Comparison of in-migration between Columbus, Cleveland, and Cincinnati, compared to migration to the United States.

Columbus has the largest in-state in-migration rate in Ohio, but has negative in-migration when compared to the rest of the United States, which Renn has interpreted to mean that Columbus “exports [people] to the rest of the country.” He has attributed one of the main sources of this trend to students of The Ohio State University.

Race and Ethnicity Indicators

Of the total population in Columbus in 2010, 61.5%, or 483,677 people, self-identify as white, 28.0% (220,241 individuals) identify as black, 44,359 people, or 5.6% of the population, identify as Hispanic or Latinx, 4.1% or 31,965 people, self-identify as Asian, 3.3% (26,086 individuals) self-identify as two or more races, 22,447 (1.2% of the total) choose “other race” as their racial identity, and the remaining 0.3% of the population, or 2,105 individuals, self-identify as American Indian or Alaskan Native (U.S. Census Bureau).



Racial distribution with white as a percentage of the total on top and black as a percentage of the total below in 2018 (Statistical Atlas).

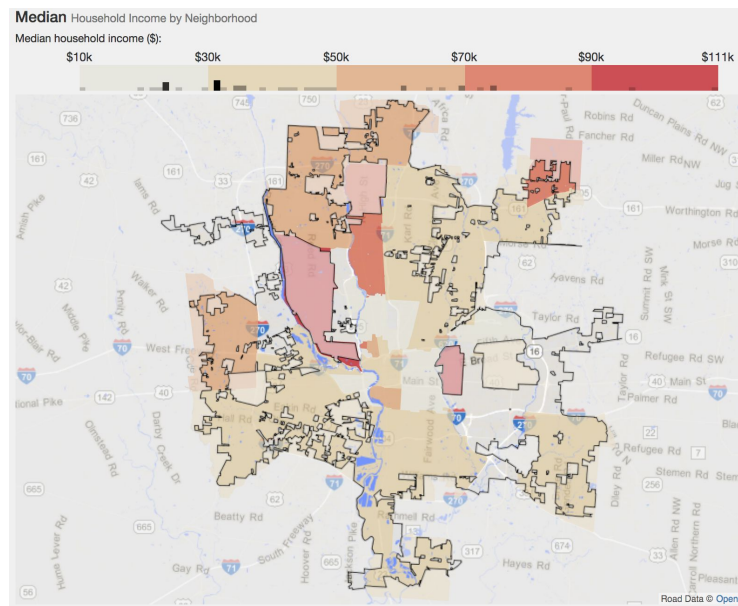
Age and Life Expectancy Indicators

The median age in Franklin County is 33.9 according to the 2012 to 2016 American Community Survey. 12.8% of the population of Franklin County is between the ages of five and fourteen, which is about 157,711 people. 10.8% of the population is aged 65 and above, or roughly 133,068 individuals; based on the United Nations standard, Franklin County does not register as an aged society, while Tokyo is a super-aged society. 69.2%, approximately 852,625 people is of a working age, between fifteen and 64. The average life expectancy for the state of Ohio is 77.9, which is approximately 1.2 years less than the

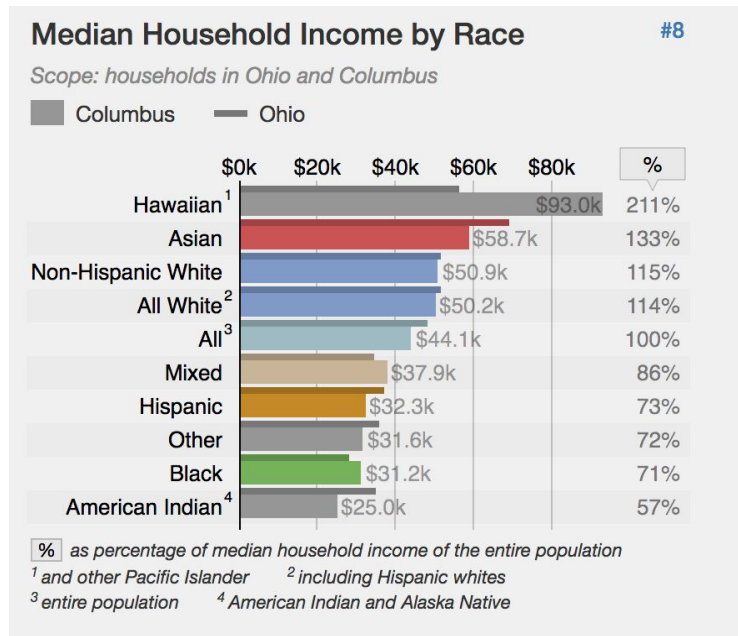
national life expectancy of 79.1 years. The average life expectancy in Franklin County is 77.6 years, but two neighborhoods -- Franklinton, with a life expectancy of sixty years, and Hilltop, with a life expectancy of 61.6 years, represent two of the four Ohio communities with the lowest life expectancy; Franklinton has the lowest expectancy statewide (Viviano).

Economic Indicators

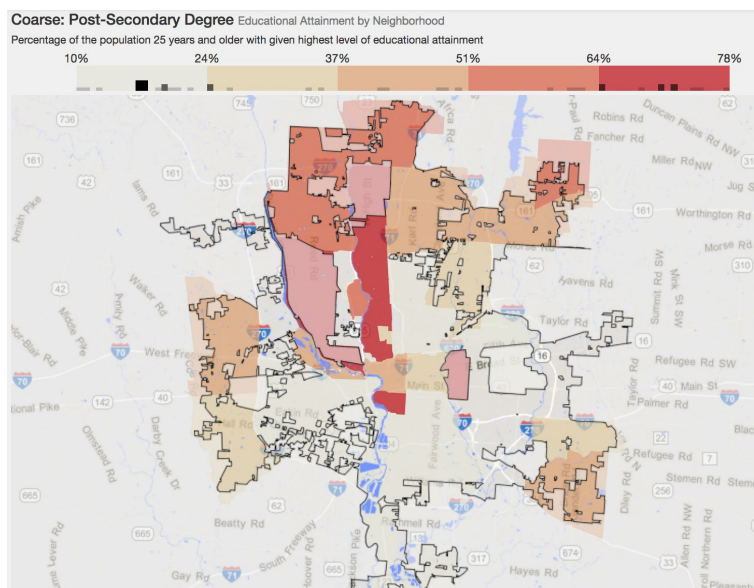
There are very clear and distinct neighborhood and racial or ethnic disparities in median household income and education level. At the same time, neighborhoods are diverse in their racial composition and this pattern closely follows the geographic distribution of other examined social determinants of health: median household income and educational attainment by neighborhood. According to data collected from the U.S. Census Bureau, the Columbus income inequality of 0.466, measured using the Gini Index, is lower than the national average of 0.482 in 2018.



Geographic distribution of median household income in 2018 (Statistical Atlas).



2018 median household income by race, as a percentage of the median household income of the population (Statistical Atlas).



2018 geographic distribution of populations with a post-secondary degree as a measure of educational attainment in Columbus (Statistical Atlas).

VI. INFANT MORTALITY OVERVIEW

Definitions and Calculations

Infant mortality is defined as the death of a liveborn infant before his or her first birthday. The infant mortality rate is defined as the number of deaths occurring under one year, calculated out of 1,000 live births. In this metric, the United States currently ranks 31st out of the 34 OECD countries, while Japan

currently ranks third out of the 34 OECD countries, according to the most recent 2018 data released by the OECD.

Disability-adjusted life expectancy (DALE) measures the number of life years expected to be lived in full health. Globally, there is a strong linear relationship between infant mortality rate and disability-adjusted life expectancy: as the infant mortality rate rises, DALEs fall. “The strong linear relationship between [infant mortality rate] and DALE means that IMR accounts for more than 80% of the variance of the DALE” (Reidpath and Allotey, 345); this suggests that one measure could serve as a proxy for the other. “The fact that [these measures] are so highly correlated merely goes to reinforce the intuition that the causes of infant mortality are strongly related to those structural factors like economic development, general living conditions, social well-being, and the quality of the environment, that affect the health of entire populations” (Reidpath and Allotey, 345).

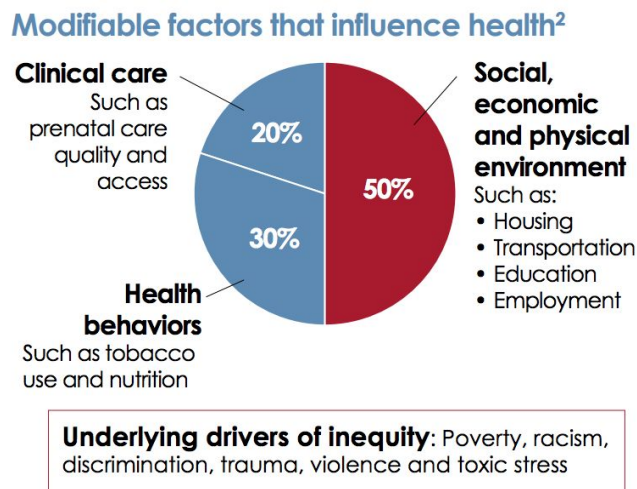
Purpose

General measures of population health, like life expectancy or disability-adjusted life years (DALYs), are used to compare the health of one population longitudinally or the health between populations at a single point in time (Reidpath and Allotey, 344). They can also be used to evaluate health systems or health programs. Population health measures often become the principal focus of policy and can have negative overall consequences, such that “health strategies and health priorities are formulated with the proxy outcome measure in mind. As a consequence, health policies begin to target the chosen outcome measure, while ignoring the rest of the population for which the outcome measure was supposed to be an indicator” (Reidpath and Allotey, 344). Infant mortality is regarded as a highly sensitive measure of population health as it provides key information about maternal and child health and is an important marker for the overall health in a society. Infant mortality is also critical for policy decision, as two of the eight Millennium Development Goals directly reference this metric (Gonzalez and Gilleskie, 702).

Infant mortality can serve as an indicator of deprivation and is one of the most revealing measures of how well a society is meeting the needs of its people; while it is defined as a measure of infant death, it is also a measure of the community health status, the poverty and socioeconomic status in a community, and the availability of health services, but it does not directly address disparities between subpopulations (Cramer, 299). Comparisons of infant mortality rates are used to evaluate public health interventions and are utilized in needs assessments. At least two of the eight Millennium Development Goals established in September 2000 directly reference this barometer, while “infant mortality...can be used to gauge the

trends in woman and child health, the quality and availability of medical care, public health practices, and the economy overall” (Barnett and Reece, 1). Infant mortality can reveal concerns about adolescent pregnancy rates, poverty and race disparities, and federal spending on social welfare programs.

Researchers estimate that clinical care only makes up 20% of the factors that influence health and early childhood outcomes, while health behaviors make up 30%, and the remaining 50% are due to demographic, socioeconomic, and physical environmental characteristics (Health Policy Institute of Ohio, 3).



Modifiable factors that influence health with underlying drivers of inequity (Health Policy Institute of Ohio).

History of Infant Mortality in the United States

The United States first began keeping records of infant mortality by race in 1850; at that point, infant mortality was so common that parents often abstained from naming their children until after they turned one year old. In 1850, the reported black infant mortality rate was over 340 deaths per 1,000 live births and the reported white infant mortality rate was nearly 217 deaths per 1,000 live births (Villarosa). From 1915 to the 1990s, overall infant mortality rate dropped by over 90% due to the advent of improvements in hygiene and sanitation, nutrition, living conditions, and healthcare that accompanied the industrialization revolution and subsequent economic transition of the nation. The *New York Times* writes that this was “a decrease unparalleled by reductions in other causes of death.” However, the number of babies born with a low birth weight has increased for the first time in the past decade and the United States is one of thirteen countries in which the maternal mortality rate is worse than it was 25 years ago (Villarosa); maternal mortality is defined as the death of a woman to a cause related to her pregnancy or childbirth, up to one year after the end of pregnancy. Black women in the United States are three to four times more likely to die from pregnancy-related causes than their white counterparts -- this

disproportionate rate is higher than Mexico, where nearly half of the population lives in poverty (Villarosa).

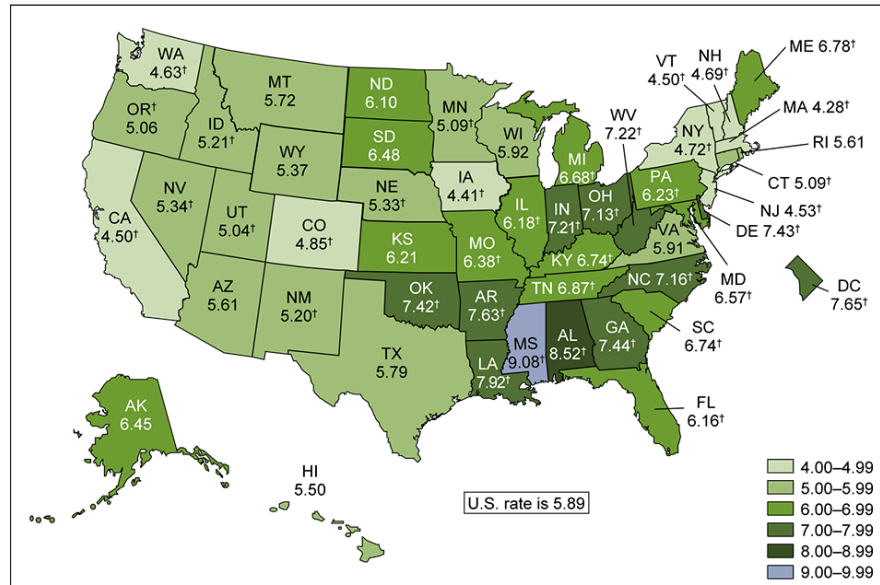
The rapid decline of infant mortality in the United States in the twentieth century (over 90% from 1915 to the 1990s) can be considered a consequence of improvement in breast milk supplies, sanitation, and the availability of immunizations and medical technologies, like antenatal corticosteroids and intrapartum antibiotics targeting high risk pregnancies (Villarosa). However, since 2001, the national infant mortality rate has remained stagnant between 6.8 and seven deaths per 1,000 live births (Association of Maternal and Child Health Programs). Though the United States has reached historic lows, difficulties in removing disparities between races, ethnicities, and other demographic characteristics persist.

VII. INFANT MORTALITY IN FRANKLIN COUNTY

National Infant Mortality Rates and Trends

In the United States, infant mortality rates are geographically highest in the southeast and moderately high in the midwest; these geographic disparities persist even after controlling for racial and ethnic distributions by state, which suggest that access to quality medical care and health insurance play a crucial role. Nationally, infant mortality rates range from 12.9 deaths per 1,000 live births in Washington, D.C. and ten deaths per 1,000 live births in Mississippi to four deaths per 1,000 live births in Washington state and Massachusetts (Association of Maternal and Child Health Programs). In 2018, the leading causes of infant mortality in the United States were, sequentially, birth defects, preterm birth and low birth weight, sudden infant death syndrome, complications during pregnancy, and accidents or injuries.

Figure 1. Infant mortality rates, by state: United States, 2013–2015



†Significantly different from the U.S. rate.

NOTES: Rates ranged from 4.28 to 9.08 per 1,000 live births. Access data table for Figure 1 at: https://www.cdc.gov/nchs/data/databriefs/db295_table.pdf.
 SOURCE: NCHS, National Vital Statistics System.

Infant mortality rates by state according to the National Vital Statistics System, 2013–2015.

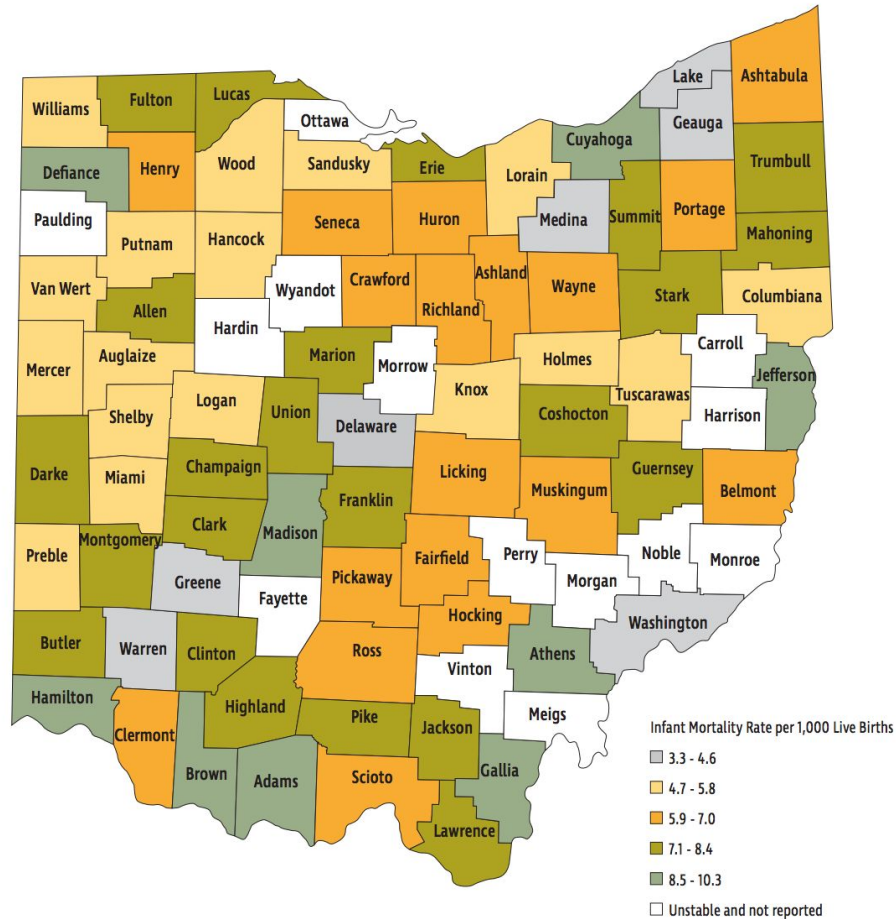
While the initial goal for infant mortality reduction was 4.5 deaths per 1,000 live births, it was increased to 6.0 deaths per 1,000 live births, as the national rate decreased only from 6.89 deaths to 6.86 deaths per 1,000 live births from 2000 to 2005 (Garcia-Alexander et al., 4).

Nationally, black babies are more than twice as likely to die as white infants and this racial disparity is currently wider than it was in 1850, a time when black women were still enslaved and considered chattel (Villarosa). This translates to 4,000 more black babies dying each year and, as the *New York Times* writes, “a black woman with an advanced degree is more likely to lose her baby than a white women with less than an eighth-grade education.”

Ohio Infant Mortality Rates and Trends

From 2016, 1,024 babies died before their first birthday, while 982 babies died before one year of age in 2017. This 2017 rate is the lowest observed in the past two years, as the overall state infant mortality rate was 1,005 in 2015 (Ohio Department of Health, 2). Even though the infant mortality rate for white infants was lower in 2017 than in 2016 or 2015, “the rate for black infants was higher, with black infants dying at three times the rate as white infants. Neonatal deaths...account for most of the black/white infant mortality disparity” (Ohio Department of Health, 1).

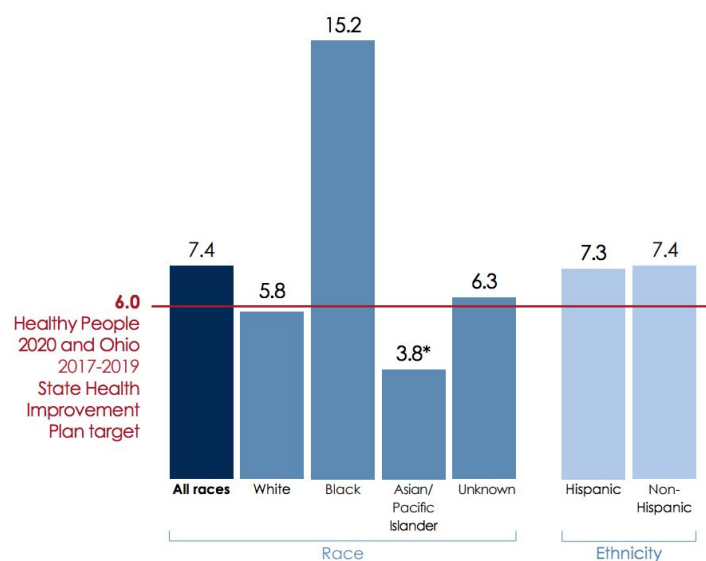
Figure 3: Ohio Infant Mortality Average 5-Year Rate, by County (2013-2017)



2013-2017 five-year trend for infant mortality rates by county in Ohio (Ohio Department of Health)

Set in accordance with the national Healthy People 2020 goal, Ohio's target is also to reach 6.0 deaths per 1,000 live births across all racial and ethnic groups. In 2010, the state's overall infant mortality rate was 7.7 deaths per 1,000 live births and currently, an estimated 150 babies die before one year of age annually in Franklin County (Ohio Department of Health). In 2010, the state of Ohio had the fourth highest infant mortality rate in the United States; however, this statement doesn't capture the full picture: nationally, Ohio had the *fourteenth* highest infant mortality rate for white babies, but the *second* highest rate for black babies. While national infant mortality rates have declined by 12%, Ohio rates have not followed this same trend (Barnett and Reece, 1).

Figure 2.1. **Ohio infant mortality rate, by race and ethnicity (2016)** Number of infant deaths, per 1,000 live births



Source: 2016 Ohio Infant Mortality Data: General Findings, Ohio Department of Health

Racial and ethnic disparities in infant mortality, compared to the Healthy People 2020 and Ohio State 2019 target (Ohio Department of Health).

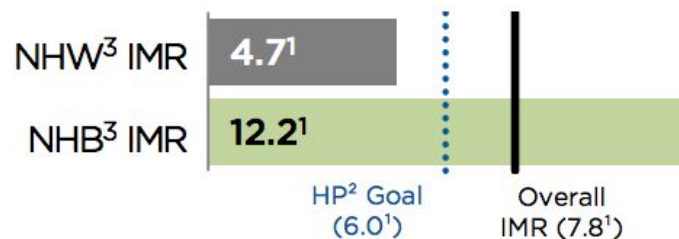
“In all cases, infant mortality is greater for blacks than for [whites and Hispanics]; this racial difference is greater among married than among single mothers, and it is greater among high school dropouts than among mothers who have at least completed high school” (Cramer, 310). Since 1980, the infant mortality rate ratio in the United States between white and black infant mortality rate has increased from two deaths in 1980 to 2.4 deaths in 2009 (Association of Maternal and Child Health Programs).

Franklin County Infant Mortality Rates and Trends

The 2016 white infant mortality rate in Franklin County was estimated to be 5.8 deaths per 1,000 live births, while the black infant mortality rate was approximately three times as high: 15.2 deaths per 1,000 live births -- this equates to approximately two to three babies dying weekly in the county (Franklin County Public Health).

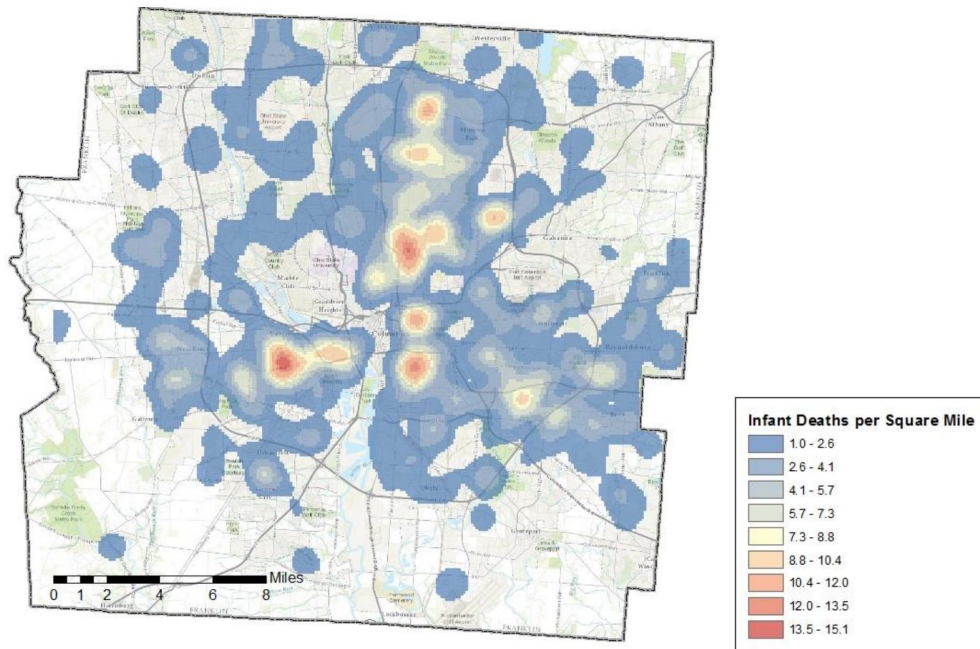
In September 2018, the most recent month with available data published by the office for Infant Death and Birth Indicators in Columbus Public Health, 1,551 babies were born: 12.0% were preterm and 9.0% were of a low birth weight; the Healthy People 2020 goal is to have an 8.1% preterm birth rate and 7.8% low birth weight rate. This month also saw eight infant deaths (one female and seven males), one of which was sleep-related. 88% of these deaths were in the neonatal mortality period (birth to one month of age) and 13% of the deaths were in the postnatal mortality period (one month to one year of age). 63% of

the infant deaths were of a non-Hispanic black heritage, while only 31% of the births were to non-Hispanic black women. From January 2018 to September 2018, 13,665 babies were born, with 10.7% being preterm and 9.0% were of a low birth weight. 106 babies died before their first birthday, such that the infant mortality rate was 7.8 deaths per 1,000 live births. 22 deaths were sleep-related (one out of every 4.8 deaths). 1.3 males died for every one female death. 71% of the deaths were in the neonatal mortality period and 29% died in the postnatal mortality period. Non-Hispanic black infants were 2.6 times more likely to die than non-Hispanic white infants; 49% of infant deaths were to non-Hispanic blacks, yet only 31% of the births were to this cohort.

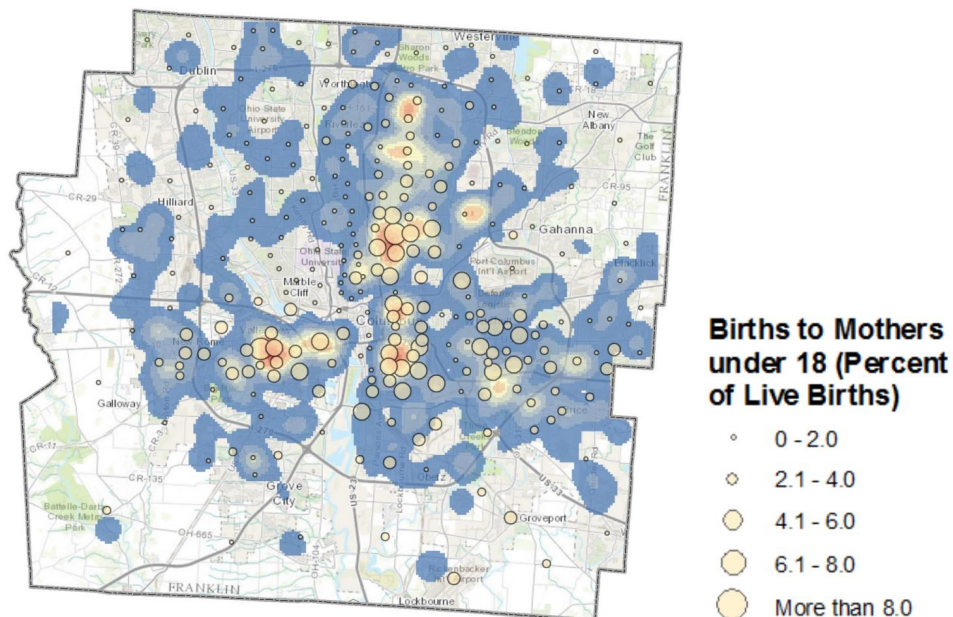


Graph of the non-Hispanic white infant mortality rate compared to the non-Hispanic black infant mortality rate from January to September 2018 as compared to the Healthy People 2020 goal and the overall rate in Columbus.

Jason Reece and David Norris, through the Institute for Population Research at The Ohio State University, employed what they called the hotspot process to calculate the “topography” of infant deaths by mapping deaths per square mile in Columbus over a five-year period using census geography and census tract boundaries. Data derived from health outcomes, health services, risk factors, social determinants, and programmatic systems. This allowed them to identify eight areas, the “hotspots,” with more than ten infant deaths per square mile: Hilltop, Franklinton, Morse/161, South Linden, Near East, Near South, Northeast, and Southeast; most of these areas are recognized medically-underserved areas. Two of the hotspots, Hilltop and Franklinton, have two of the four lowest life expectancies in the entire state of Ohio (61.6 years and sixty years, respectively).

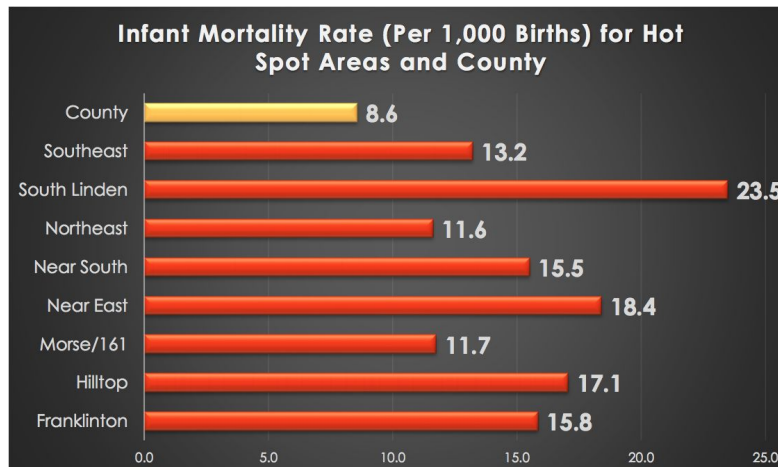


Density of infant deaths per square mile; the eight red spots also correlate to eight medically underserved areas.

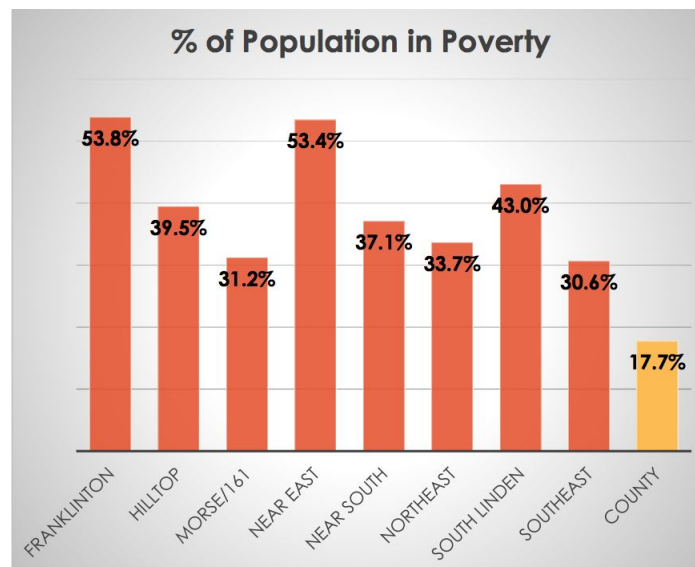


Density of births to mothers below the age of eighteen as a percentage of the total.

Nearly 25% of all infant deaths and 33% of non-white infant deaths occur within these hotspot zones with only 9% of the total county population and 12% of the total births. Only 17% of the non-white minority population lives in these boundaries, but these regions see 30% of the non-white infant deaths in Columbus (Reece and Norris, 16).



Infant mortality rate for each of the eight hotspot areas as compared to the overall county.



Poverty rate for each of the eight hotspot areas as compared to the overall county.

In addition to disturbing inequities and disparities in infant mortality rates, Reece and Norris also found a very poor base of programmatic data and public health data was generally rich, but not shared easily. They emphasize the need for an ongoing collection of data and ongoing surveys of programmatic interventions with better coordination and collaboration across stakeholders.

Causal Factors

Infant mortality poses a long-standing and persistent concern for public health institutions; Columbus Public Health describes it as “not just a healthcare issue. Jobs, education, access to care, housing, safety, where you live -- all play a key role.” Key causal factors for infant mortality recognized in Franklin County are pregnancies less than eighteen months apart, the mother’s health before and during the

pregnancy, unplanned pregnancy, late or no prenatal care, unsafe sleep practices, prematurity, and low birth weight; however, nationally since 2013, preterm birth has remained the leading cause of infant mortality and suffocation-related accidents have been the leading cause of injury-related death before an infant's first birthday. Data indicates that sleep-related deaths have decreased, while other causes have increased (Franklin County Public Health).

Groups at high risk for losing an infant before their first birthday include teenagers, black women, unwed mothers, mothers of low socioeconomic status, and mothers with less than eleven years of schooling. The strongest associations are between race and education and infant mortality. Education may serve as a potential source of spuriousness (Cramer, 309), as infant mortality and maternal education has an inverse relationship, but the risk of infant mortality associated with a low level of maternal education is greater among whites and blacks than Hispanic parents. However, it may be difficult to decipher and unravel the influences of these factors, as some of them overlap. For instance, teenagers are likely to be unwed, so determining which factor (age or marital status) or whether it is the combination of both that may be causal is difficult. By their very nature, all social factors interact with at least one other factor to precipitate health outcomes and mortality, infant or otherwise. There are no unconditional associations with any health indicator, as all social factors are somehow related or involved in at least one interaction. There may be physiological linkages between low birth weight or other poor infant health outcomes through maternal health, nutrition, or maternal use of alcohol, tobacco, or other drugs. At the same time, there may also be social linkages, more directly associated with prenatal care usage, through poverty, lack of knowledge, attitudes and beliefs regarding medical care and health institutions, availability and performance of medical services, and legal or social barriers, such as racial discrimination, legal rights of adolescents, and welfare eligibility rules (Cramer, 318).

There may be an ambiguous threshold at which biological causal factors exceed social factors: at very low birth weights, white and black infants have about the same infant mortality rate. Birth weights and the risk of infant mortality share an inverse relationship -- the lower the birth weight, the higher the probability of death before one's first birthday. Differences in risk are "nonetheless socially meaningful and politically sensitive" (Cramer, 299). Birth weight and the timing of prenatal care services are proximate determinants and prenatal care may be an intervening variable between social factors and birth weight and infant mortality overall. Little, late, or no prenatal care has been directly linked to a higher rate of infant mortality, though the regionalization of prenatal care-related services have been linked to improvements in rural and isolated regions. "The mothers who are most likely to have late or no prenatal

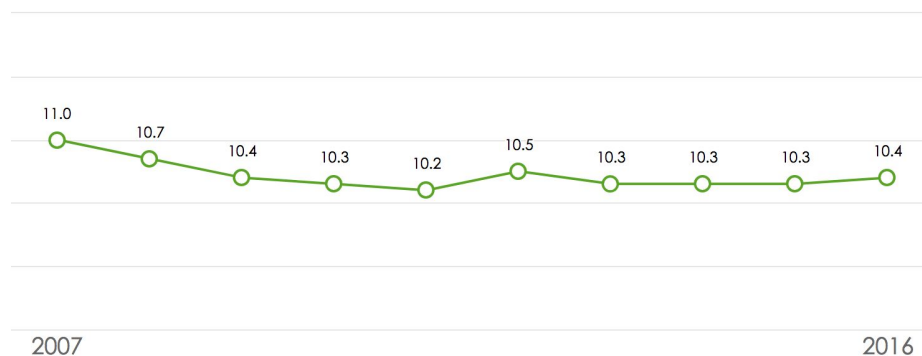
care and low birth weight babies -- those under age twenty, single, black, and with low education -- are also the mothers with higher infant mortality rates, suggesting the possibility that they have high infant mortality *because* they have late prenatal care and low birth weight babies” (Cramer, 312). As is demonstrated with prenatal care, a lack of healthcare coverage and access is a driver of health inequalities that parallel risks of infant mortality. Families and communities that have faced social and economic disadvantages face obstacles in accessing and receiving quality prenatal care and optimal health.

VIII. FRANKLIN COUNTY INDIVIDUAL FACTORS

Within the social ecological model definition as it applies to infant mortality and other facets of maternal and child health, the “individual” at play can be considered as the infant or the mother; yet because this model is a framework that exists on a spectrum, these factors cannot necessarily be fully and completely isolated to the specified individual, nor can any factor on any social ecological stratum be entirely restricted to that particular component.

Prematurity

Prematurity affects one in nine infants across the United States -- this disturbing ratio solidifies this individual factor as the leading cause of infant mortality nationally, behind 35% of infant deaths. For the second straight year, the rate of preterm birth is increasing across the nation; in 2016, the rate rose 2% to 9.8% of all live births (March of Dimes); they also found that Ohio’s rate decreased from 11.0% in 2007 to 10.4% in 2016, but has been increasing slightly ever since, from 10.3% to 10.4%. On the other hand, Ohio ranks fifteenth among “states with the highest rate of preterm deliveries at a rate of 12.7%, a rate higher than the 11.4% set by the Health People 2020 objective” (Barnett and Reece, 2).

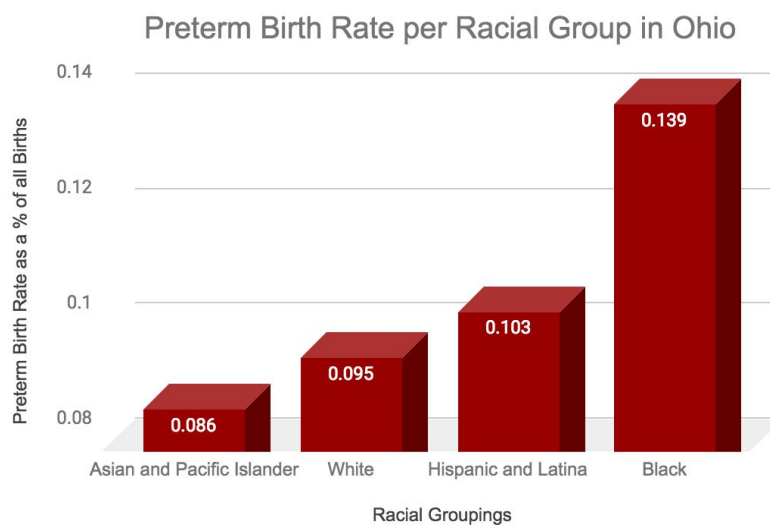


March of Dimes’ timeline displaying the changing rates of preterm birth in Ohio from 2007 to 2016.

March of Dimes’ Premature Birth Report Cards highlight priority areas for action with data explicating disparities between county and racial or ethnic differences. Their mission has the ultimate goal to give

“every mother and baby a fair chance for a healthy pregnancy and birth” (March of Dimes, 2018). Ohio, with its preterm birth rate of 10.4%, received a D-grade; Washington, Oregon, New Hampshire, and Vermont were the only states to receive a grade of an A. Franklin, Lucas, Hamilton, and Summit counties were the only ones to receive a D grade; Cuyahoga and Montgomery Counties were the two lowest-ranking counties that received a failing score in the state of Ohio. The organization writes that “babies have a higher chance of preterm birth based simply on race and ZIP code.”

The March of Dimes’ disparity ratio measures and tracks progress towards the elimination of racial and ethnic disparities in preterm birth, based in accordance with the Healthy People 2020 methodology. Progress is evaluated by comparing the current ratio to a baseline, such that the lower the ratio, the better the disparity quotient. A ratio of one signifies no longitudinal improvement; Ohio’s disparity ratio of 1.31 equates to roughly no improvement over the past years. Unfortunately, this disparity ratio is not as encouraging or positive as it might appear at first glance: in the state, the preterm birth rate for black women is 46% higher than the preterm birth rate for women of all other races (March of Dimes).



Infant mortality rate by racial and ethnic grouping.

The preterm birth rate for Asians and Pacific Islanders in Ohio is the lowest rate observed for Asian and Pacific Islander women in the country, while the white preterm birth rate is 10.0% higher in Ohio than the lowest rate nationally observed for women of this race. The preterm birth rate for women of Hispanic or Latina ethnicity is 20.0% higher than the lowest rate nationally, while the black preterm birth rate is 62.0% higher than the lowest rate observed nationally (March of Dimes).

Low Birth Weight

Low birth weight is defined as weight less than 2,500 grams at birth with a variety of risk factors including birth defects, chronic maternal health issues, maternal alcohol or tobacco use, socioeconomic status, and being of the African-American race. 8.6% of all births in Ohio were of a low birth weight, with racial disparities prevalent among the rates: 13.6% of non-Hispanic black births were of a low birth weight, compared to a 7.3% rate among non-Hispanic whites and 7.5% of Hispanic births (Barnett and Reece, 2).

Sleep-Related Deaths

Sudden unexpected infant death syndrome (SUID), or death within the first year of life that is immediately unattributable to any known cause of death, even after a thorough investigation, including, for instance, complete autopsies, a review of the infant's clinical history, and an examination of the death scene. SUID can be caused by poisoning, accidental or otherwise, overdoses, issues with metabolism, infections, accidental suffocation, unknown causes, or sudden infant death syndrome (SIDS) -- a sudden death that occurs when a seemingly healthy infant is sleeping. According to the 2009 IM [Infant Mortality] Task Force Report, "the largest number of infant deaths was attributed to sudden infant death syndrome...risk factors include smoking, lack of breastfeeding, and a lack of a safe sleeping environment" or safe sleeping practices. Nationally, SIDS was the largest contributor to infant mortality in 2009 and the syndrome was more common among mothers who were not married, infants born in a subsequent pregnancy (essentially, not the firstborn child), and whether the mother, or family as a whole, resided in a "socioeconomically disadvantaged area" (Barnett and Reece, 3).

The sleep environment of the infant is crucial, as sleep-related deaths are those that occur unexpectedly and/or suddenly in a sleep environment and "represent one of the leading causes of infant death...more than three infant deaths each week are sleep-related [in the state of Ohio]" (Barnett and Reece, 5). In Columbus, a baby dies every two weeks from unsafe sleep practices. The current pediatric recommendation follows the initialism, ABC: *Alone*, on one's *Back*, and in a *Crib*, in that children should sleep on their back in an empty crib without blankets, pillows, stuffed toys, or other humans. This paradigm exists to the contrary of traditional and cultural Japanese co-sleeping practices and recommendations, which will be explored later in this thesis. Although American pediatricians and researchers promote that the best sleeping position is on the infant's back, not all mothers report putting their child to bed in this manner. Research published by the Kirwan Institute at The Ohio State University found that at least a third of infants in Ohio sleep in "a prone position [on their chest and stomach] most

of the time.” 72% of mothers overall in Ohio self-report positioning their child to sleep on their back before bedtime and naptime, although only 53.2% of black mothers place their babies on their back, compared to 76.4% of non-Hispanic white women (Barnett and Reece, 5).

Maternal Age

For maternal individual-level factors, age is a primary focus, as women who are in the younger age quartile and the older age quartile both face certain risks precipitating infant mortality. Infants born to teenagers and to older women are at an increased risk of dying within their first year of life; in Japan, the vast majority of pregnancies occur between the ages of 25 and 29, when the risk of infant mortality and other adverse health outcomes is the lowest. “Giving birth during adolescence has substantial short- and long-term impacts on girls...[including] adverse health, educational, emotional, social, and financial outcomes” (Ohio Department of Health, 2016). An older maternal age is linked to a higher risk of infant mortality overall, while a lower maternal age is a significant risk factor for SIDS and teenage mothers are more likely to suffer from postpartum depression.

Teen Pregnancy

In Ohio, by age 22, 38% of girls who give birth before age eighteen receive a high school diploma, compared to 60% of girls who give birth between ages eighteen and nineteen and 90% of girls who don’t give birth at all during the adolescent stage. Nearly 17% of births to teenage girls between ages fifteen and nineteen were repeat births, which further reduce their already diminished educational and economic opportunities (Ohio Department of Health). Children born to adolescent mothers are more likely to suffer from low birth weight, infant mortality, lower emotional support or cognitive stimulation, having less preparation to learn when entering kindergarten, behavioral problems, chronic medical conditions, heavier reliance on publicly-funded healthcare, and higher rates of foster care placement. Between 1991 and 2010, births to adolescent mothers have cost Ohio taxpayers approximately \$9.8 billion through public healthcare, child welfare, increased rates of incarceration for the children, and lost tax revenue to decreasing earnings and spending (Ohio Department of Health).

There was a steady decline in teen pregnancies and births in Ohio from 2009 to 2015 across all races and ethnicities; the highest rates, however, continue to persist among non-Hispanic black and Hispanic or Latina teenagers, who are an estimated 2.6 times more likely to give birth than white adolescents. Overall, Ohio’s teen birth rate of ten per 1,000 females was less than the national average of 10.9 per

1,000 females, however Franklin County's teen birth rate, specifically, was 12.8 per 1,000 females from 2013 to 2015 (Ohio Department of Health).

Risky Sexual Behavior in Adolescence

The Youth Risk Behavior Survey is a biennial national survey of adolescent health risk and health protective behaviors conducted by the Centers for Disease Control and Prevention. In 2015, results among Ohio high schoolers, published by the Ohio Department of Health, found that 30.1% of teenagers had sexual intercourse with at least one person in the past three months. 3.9% engaged in sexual intercourse for the first time before age thirteen and 11.5% had sexual intercourse with more than four people in their lifetime. 20.6% of teenagers admitted to using drugs or alcohol before their most recent sexual encounter, while 13.8% of teenagers didn't use preventative contraceptive methods in their most recent experience. The CDC had declared that Ohio's teen birth rate was a "winnable battle," based on the magnitude of the health problem and the capability of public health officials to respond and make progress to the health issue.

Maternal Stress

Maternal stress, or the stress a mother experiences before and during a pregnancy, can have chronic health implications, such that stressors encountered even before a pregnancy can have impacts on the baby's health outcomes. Maternal stress has been linked to increased rates of preterm delivery and can be considered a precursor or indicator of racial disparity in preterm delivery, as black women face many stressors, ranging from chronic racism and discrimination to poverty. Because of this disparity, stress can have implications for racial and ethnic disparities in prematurity and other birth outcomes. Researchers found that a "state's life satisfaction was [inversely] correlated with its infant and neonatal mortality rates...residents [who] reported higher levels of life satisfaction had lower rates of infant mortality" (Barnett and Reece, 3). Life satisfaction, as the overall assessment of thoughts and feelings at a particular instance in one's life, can serve as the opposite focal point from stress experienced by mothers prior to and during pregnancy. As a state, Ohio ranked 43rd in life satisfaction and eleventh in infant mortality (Barnett and Reece, 3).

Tobacco Exposure in the Womb

Fetal exposure to tobacco, especially during pregnancy, is a major risk factor as children of smokers have consistently worse health outcomes than children of non-smokers. Smoking during pregnancy and tobacco use in the presence of an infant post-birth increases the chance of SIDS. However, this

correlation exists only to an extent, as black women who *did not* smoke during pregnancy had worse birth outcomes than children of white women who *did* smoke (Barnett and Reece, 3).

Maternal Nutrition

Optimal birth outcomes depend on consistent intake of health nutrients and poor fetal growth is caused by a lack of nutrients, energy, and proteins. Middle- and low-income women were found to have lower daily intakes of vitamin D, phosphorus, folate, calcium, and iron, while having higher levels of fat and sodium and these diet tendencies predisposes them to having preterm births, birth injuries and defects, and other adverse health outcomes (Barnett and Reece, 11).

Breastfeeding

Breastfeeding infants can counterbalance risks and decrease the chance of postnatal mortality.

Breastfeeding infants is associated with a 20% lower risk of dying in the postnatal period and a reduced risk of SIDS, compared to infants who aren't breastfed (Barnett and Reece, 4). Ohio ranked sixth lowest in the rates of mothers who self-report not breastfeeding -- 62.3% of mothers in Ohio breastfeed, compared to a national rate of 76.9%. Black mothers, mothers with less education, and mothers enrolled in the WIC -- the national special supplemental nutrition program for Women, Infants, and Children -- are less likely to continue to breastfeed after two to six months of giving birth (Barnett and Reece, 4).

According to statistics by the Centers for Disease Control and Prevention's Breastfeeding Report Card, in 2015, 83.2% of mothers in the United States had ever breastfed their infant. A slightly smaller proportion in Ohio, 81.9% of mothers, had ever breastfed. 57.6% of mothers in the United States reported breastfeeding at six months and only 35.9% of mothers across the country were breastfeeding at twelve months. In Ohio, 53.1% of mothers were breastfeeding at six months postpartum, and 30.7% of mothers were still breastfeeding their infant at one year of age.

IX. FRANKLIN COUNTY INTERPERSONAL FACTORS

Single Motherhood

In maternal and child health, one of the most significant members of the social network is the father or male figure. Missing paternal indicator data on birth certificates -- mothers with their maiden names, no father listed, or no other demographic indicators of the father listed -- demonstrates little or no paternal involvement; infants born to single mothers consistently have worse birth and health outcomes than infants born to married mothers or mothers in a relationship, regardless of race or ethnicity (Barnett and

Reece, 6). Lack of male details on a birth certificate and lack of a male presence may equate to the lack of a supportive male or male role model for the child and mother. Especially for minority women, male family figures can serve as a buffer for stress. Families with only a single female head of household are more likely to be impoverished more frequently and for longer periods of time. Infants born to women who are victims of domestic abuse by a partner are more likely to be premature, have a low birth weight, or die before one year of life.

Empathetic Social Network

Being well-connected can generate access to material and knowledge resources and improve health. Charles Noble, a lecturer in the 2015 TEDxColumbus seminar, suggested using empathy as the focus of a new social network design, suggesting that “by rearticulating social networks to include more diversity, we can immediately begin leveraging this social determinant of health to affect the rates of infant mortality around the state of Ohio” (Noble). In doing so, this investment towards infant mortality reduction is leveraged outside the direct medical causes of infant death or the direct actions taken in the healthcare domain to ameliorate infant mortality rates.

Racial Disparities

While black families, and black single mothers in particular, face the highest crude mortality rates (Barnett and Reece, 6), which is defined as the total number of deaths due to any cause of residents in a specific geographic area compared to the total population in the same region, they are also confronted with the highest observed infant mortality rate. The high infant mortality rate observed in Columbus doesn’t capture the full tragedy of racial disparity, as black babies account for approximately 18.5% of live births in Ohio, and a third of the state’s infant mortality rate (Noble). Black and minority women and families are over-represented in areas with disproportionately high infant mortality rates, with 17% of the non-white Columbus population, but 30% of non-white infant mortality (Reece and Norris, 16). They proposed that “low income communities of color [are] indicating significant neighborhood distress,” particularly Near South, Near East, and South Linden, while Hilltop and Franklinton are predominantly white communities with similar levels of neighborhood distress, such that it is not solely race, but the confluence of factors that are affecting these communities and demanding specific and urgent response.

Racism

Internalized racism is defined as the acceptance of stigma and negative messages about one’s self-worth, which translates into an embrace of self-devaluation and helplessness; Robin Nicole Johnson-Ahorlu, a

project director at the Center for Policing Equity, describes it as both the “conscious and unconscious acceptance of a racial hierarchy in which whites are consistently ranked above people of color.” Black women with more adverse birth or pregnancy outcomes self-report experiencing or facing racism at a higher level than their black counterparts with better health outcomes. This correlation exists for even black women who share the same providers as it factors more heavily in their experience of chronic stress and therefore, their health status (Ohio Statewide Health Disparities Collaborative). At the same time, maternal health services staff’s race and ethnicity does not usually represent their patient population, which translates to little or no minority representation in the decision-making hierarchy; as such, minority staff often report feeling marginalized or excluded (University of Leeds, 2013). Ethnic inequalities in maternal health have been linked to substandard care. Higher spending on prenatal and related care is unlikely to reduce the rates of infant mortality unless “services are tailored to the needs of the populations they serve” (University of Leeds, 2013).

Religion

Religious ecology is the community-level market share, defined by the number of churches in a community, of different types of denominational families. It has been shown to have an impact on adult mortality, suicide, and homicide. Religiosity can increase quality of life and the social climate of community and these trends are consistent over time. Counties in Ohio with a greater share of Catholic churches have a lower infant mortality rate; although evangelical churches distinguish themselves from the secular world, the desire to attract converts entails maintaining a degree of engagement with the surrounding culture. Catholic and some Protestant churches tend to be more “civically minded, externally-facing institutions that emphasize community-level care” (Garcia, Bartowski, Xu, 892). It is this secular viewpoint that is shunned by their more fundamentalist or Pentecostal counterparts. Counties with a greater share of conservative Protestant churches, particularly those associated with the Pentecostal denomination, have a higher infant mortality rate. Conservative Protestant pronatalism makes them particularly sensitive to threats to the welfare of children and is associated with less trust in conventional, Western medicine that might also be a product of the centrality of faith healing within these subgroups. The researchers, Garcia, Bartowski, and Xu, suggest that this could be due to an ideology that both preventative care and medical interventions could demonstrate a lack of faith in God or a higher power.

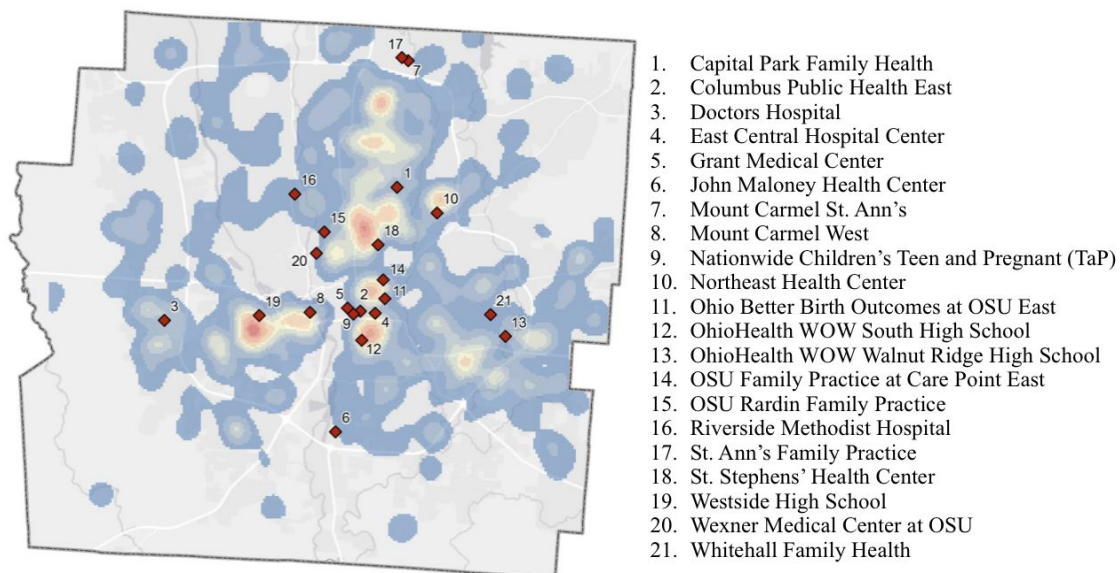
X. FRANKLIN COUNTY ORGANIZATIONAL FACTORS

Prenatal Care

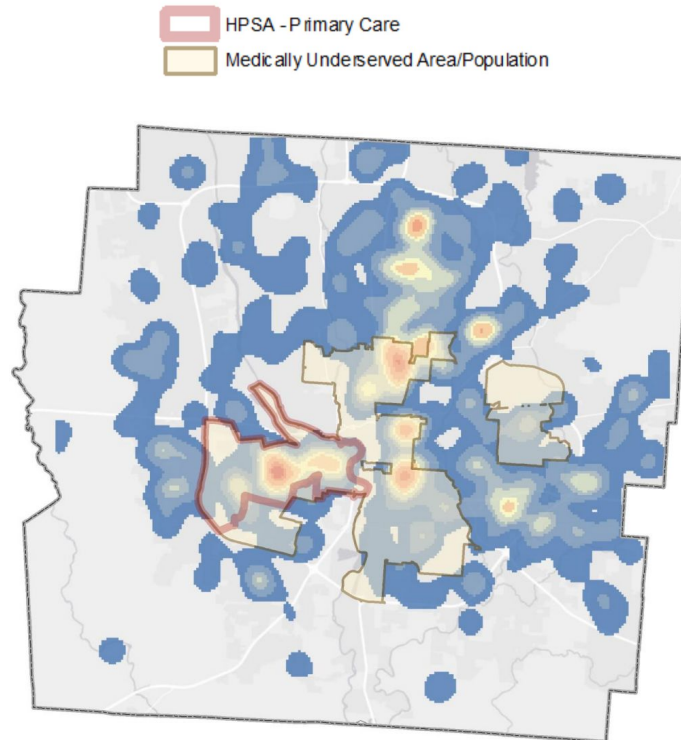
A portion of the local, national, and global decline in infant mortality can be directly attributed to medical and technological advances in the care that newborns and mothers receive; for instance, prenatal care is associated with a lower risk and occurrence of SIDS, and by extent, infant mortality. Prenatal care is a manner of preventative healthcare and involves lifestyle and nutritional advice and examinations of pregnancy health and development proffered by a midwife or obstetrician. However, 17% of mothers in Ohio did not receive any prenatal care in the first trimester (Barnett and Reece, 7). Prenatal care cannot account for all the disparity between black and white birth outcomes and even with early access to prenatal care and controlling for all other demographic factors, blacks still experience higher rates of infant mortality. Healthcare policies have improved coverage and access for minority mothers and their babies, but critically, have not improved the quality of the care that was received; thus, this improved access has neither contributed significantly towards diminishing racial disparities in prenatal care access nor birth outcomes.

Disparities in Access to Care

Jason Reece and David Norris mapped locations of public health centers on their topography of underserved and distressed hotspots to find the following distribution:



Public health clinics superposed over hotspots in Columbus; there are clinics available, but they tend to be far from the most at-risk populations or medically underserved areas.



Health professional shortage area in southwestern Columbus, along with designated medically underserved populations.

The red and yellow shaded areas represent the hotspots with the highest rates of infant mortality and teen pregnancy, as well as poverty rates. One can see that even though there are a variety of public health clinics near or in these hotspots, many still qualify as primary care health professional shortage areas and medically underserved areas. This is a rather proximate causal factor behind infant mortality, and the other poor health outcomes observed in these areas, as the lack of access to quality medical care precipitates worse outcomes, in maternal and child health as well as in other health metrics.

Education

Education is an organizational factor that operates on both the state and national level, as well as the individual. Mothers with a college degree, throughout the United States, experience less infant mortality than mothers without a graduate degree, as “states with a greater proportion of women who have attended college have lower rates of infant mortality” (Barnett and Reece, 8). Nonetheless, education has actually been shown to increase the racial disparity between blacks and whites: “the high-education population has a large racial difference in both absolute difference in the death rates and in the relative risk” (Barnett and Reece, 8). In the state of Ohio, an infant born to a black woman with five or more years of higher level education still faces a higher risk of dying before their first birthday when compared to an infant born to a white woman with a high school degree equivalent or less. In Illinois, a study found that black infants

born to a mother at the highest education level faced a higher risk of low birth weight than women of any other racial identity at any other lower education strata (Barnett and Reece, 8). These studies offer indications that educational attainment is not fully protective against infant mortality for black women and their infants.

Women in Professional Positions

Similarly, lower rates of infant mortality are correlated with states and regions with a greater percentage of women working in managerial or professional positions, while “states...with a smaller proportion of women living in poverty have a lower rate of infant mortality” (Barnett and Reece, 9). Therefore, infant mortality is positively correlated with higher levels of education and professional positions, while it is inversely correlated with poverty. As median family income decreased, a study by Maren E. Olsen et al. published in *Pediatrics*, found that rates of infant mortality, preterm birth, low birth weight, and very low birth weight increased: income inequality and inequity is positively correlated with adverse birth outcomes and preconditions of infant mortality. “The health indicator with the largest proportion of variance explained by median family income was preterm birth rate, with the smallest proportion for very low birth weight rate” (Olsen et al., 1161). These outcomes are more greatly affected by absolute wealth, rather than relative wealth.

CelebrateOne

CelebrateOne was created in November 2014 to carry out the recommendations put forth by the Greater Columbus Infant Mortality Task Force by 2020. Its main goal is to reduce the infant mortality rate by 40% and reduce the racial disparity by 50%. CelebrateOne and its partners work to tackle the most significant infant mortality-related factors, including prematurity, low birth weight, exposure to tobacco, sleep-related deaths, and health inequities by operating through three levels of initiatives targeting mothers, babies, and communities, respectively. The goal for “healthy moms and moms-to-be” focuses on improving women’s health before pregnancy, improving reproductive health planning, improving prenatal care systems and support for the highest-risk families and ensuring the highest standards of antenatal care quality, and reducing maternal smoking. The “for healthy babies” initiative focuses on reducing household smoking, improving supports for the highest-risk families, and promoting infant safe sleep. The third initiative, “for healthy communities” addresses the socioeconomic conditions that drive disparities across communities and neighborhoods where infant mortality rates are the highest. There are eleven partners in Franklin County that work on various aspects of the overall CelebrateOne goal or specific initiative goals: the Central Ohio Hospital Council, Columbus City Council, Columbus

Development Department, Columbus Public Health, Franklin County Board of Commissioners, Franklin County Family and Children First Council, Franklin County Department of Jobs and Family Services, Ohio Department of Medicaid, Ohio Better Birth Outcomes Collaboratives, Partners for Kids, and Moms2B. The executive committee consists of health commissioners, administrators for various nonprofits and government departments in Columbus, and the senior pastor from the Mt. Olivet Baptist Church, located northwest of Near South, one of the hotspots identified by Jason Reece and David Norris.

Franklin County Fetal-Infant Mortality Review

The Franklin County Fetal-Infant Mortality Review founded in January 2014 is part of a community-wide initiative and effort to decrease the mortalities in and around the city of Columbus. Following the model of the National Fetal and Infant Mortality Review Program, a collaborative effort between the American Congress of Obstetricians and Gynecologists and the Health Resources and Services Administration's Maternal and Child Health Bureau, "this model calls for the review of fetal and infant deaths under a unified process, allowing for a more comprehensive assessment of and strategic planning for infant mortality reduction" (Columbus Public Health). Currently, they oversee various implementations in Ohio to decrease infant mortality, including home visits, smoking cessation programs, breastfeeding resources, injury-prevention programs, and partnering across city and state organizations to ensure women have access to needed services.

Centers for Disease Control and Prevention National Programs

Nationally, the Centers for Disease Control and Prevention has introduced and heads various projects and organizations focused on different maternal and child health needs. The CDC Division of Reproductive Health emphasizes improvements in perinatal care and understandings of SIDS and SUID, uses data to reduce infant mortality, and builds support to ameliorate maternal and child health overall. The Maternal and Child Health Epidemiology Program uses and provides epidemiologic research and scientific information to improve maternal and child health programs and policies. The CDC National Center on Birth Defects and Developmental Disabilities identifies causes of birth defects, finds opportunities to prevent them, and works to improve the health of those living with birth defects; the center involves a public health approach that incorporates disease-tracking, research to identify causes, and prevention research and programs to translate scientific data into public health interventions. The CDC National Center for Injury Prevention and Control tracks data trends and conducts research on unintentional childhood injuries and child abuse or neglect and promotes safety by supporting solutions that will save lives and creating helpful resources for parents and public health professionals, such as the National

Action Plan on Child Injury Prevention, Protect the Ones You Love initiative, child passenger restraint guidelines, and the Essentials for Childhood framework. Finally, the CDC National Center for Health Statistics provides statistical information that will guide actions and policies to improve the health of the American people and provides critical information on infant mortality rates, including trends and causes.

XI. FRANKLIN COUNTY COMMUNITY FACTORS

Neighborhood Deprivation

There is a significant correlation between neighborhood deprivation and a risk of premature birth, in that extremely poor black infants are at an increased risk of infant mortality. Residential segregation between blacks and whites is an accurate predictor for infant mortality rates and the best predictor after controlling for poverty rates, median family income, and the proportion of single female heads-of-households. “The experiences of black women in their homes, neighborhoods, and health centers and the contexts in which they live may individually and collectively contribute to persistent racial inequality in infant mortality” (Wallace et al., 1). Chronic stress, racism, and other characteristics of the communities in which these mothers live, work, and engage may affect their reproductive health. These experiences can play out on the individual level through understandings of trauma, grieving and counseling, or lack thereof, and criminalization of petty crimes; they can also transpire through interactions with healthcare providers and the healthcare system as a whole or through broader contextual factors of the community, including economic instability, transportation, and housing. Achieving birth equity requires addressing racial and social inequalities -- universal interventions may be effective at reducing infant mortality at the highest population level, but not without first addressing the fundamental causes of racial inequalities. Elimination of racial stratification in infant mortality must be aimed at improving access to resources and opportunities in minority-dominated communities.

The infant is completely dependent upon others for survival at birth, and thus, is extremely vulnerable to negative influences upon their health and well-being. Minority neighborhoods maintain a higher level than white neighborhoods of overall mortality and adult morbidity due to “differential experiences of community stress, exposure to pollutants, and access to community resources” (Barnett, Mainor, and Reece, 10). Increasing segregation, air pollution, homicide, and the black unemployment rate were associated with larger absolute differences in black and white infant mortality rates, with a 7% to 11% greater black infant mortality rate in regions with higher rates of homicide, racial residential segregation and isolation, limited access to organic or natural foods, and air pollution. “The association between segregation and adverse birth outcomes may be mediated by greater exposure to violence, a psychosocial

stressor with impacts on biologic health” (Wallace et al., 11). In 2000, black people were three times as likely as white people to live in extremely poor or impoverished neighborhoods. Nonetheless, race is a persistent risk factor for infant mortality because black infants still face an increased risk of poor birth outcomes and infant mortality, regardless of their neighborhood.

Poverty

Poverty is viewed as one of the distal causes of infant mortality and, because it operates on a population level, it poses a risk to all women and families that exist in and engage with the institution. It facilitates an impact on health through correlates of poverty related to place of residence, environment, social norms, and behaviors. Across the United States, across Ohio, and across Franklin County, minority populations are more likely to live in impoverished areas: non-Hispanic blacks are 2.5 times as likely as whites (Barnett and Reece, 9). Poverty can exacerbate health outcomes “in the form of inferior housing, poor sanitary facilities at home, lack of adequate food and clothing, inadequate hospital or postnatal care, lack of transportation...those in poverty are often vulnerable to the experience of stressful situations” (Gortmaker, 285). All characteristics and aspects of housing and place of residence can have negative implications for the health of the infant. The relative risk of infant death is 50% greater than that of infants not born into poverty and “although the care of the mother and infant during the prenatal period is important for disadvantaged populations...poverty still, in a variety of more direct ways...exerts a substantial effect upon the well-being of the newborn” (Gortmaker, 294). Differentials in stratification correlate to and precipitate differentials in mortality through mechanisms such as parental income, maternal and paternal education, and racial or ethnic identity.

Income is a significant factor and predictor in determining relative risks. In 1918, 44% of all infant deaths happened in the neonatal period and 56% happened in the postnatal period; in 1974, 77% of all infant deaths happened in the neonatal period and the remaining 23% happened in the postnatal period (Gortmaker 283-284). The decline in the relative size of the postnatal component has been interpreted to mean that the importance of socioeconomic factors has declined over the past six decades, because socioeconomic factors are most significant in the postnatal period as deaths during the neonatal period were most likely due to “conditions present before birth or that occur in the birth predominate” (Gortmaker, 283). The “improvement of socioeconomic conditions among disadvantaged groups in the population holds the possibility of achieving greater gains in [infant] mortality reduction than advances in medical knowledge” (Gortmaker, 295).

The Ohio Equity Institute

The Ohio Equity Institute is a three-year partnership and project with eight Ohio communities and the Ohio Department of Health to focus on improving birth outcomes and reducing racial disparities. It was started as an initiative by CityMatCH, which supports urban maternal and child health efforts at the local level. In addition to infant mortality, the Institute tackles inequities in drug and alcohol use, food protection, injury prevention, minority health, neighborhood social services, sexual health clinics, and family planning. Their projects are data-driven, evidence-based, and sponsored by Columbus Public Health with related programs in Butler, Canton-Stark, Lucas, Mahoning, Montgomery, Cuyahoga, and Summit counties and the city of Cincinnati. Ohio Equity Institute efforts in Franklin County focus on the southside of Columbus, between the ZIP codes 43206 and 43207, which are areas with some of the highest infant mortality rates in the entire United States.

Experts in public health lead team trainings focusing on epidemiology, birth outcomes, health inequities, and monitoring and evaluation, while community stakeholders complete the Equity Institute Curriculum to consider, design, and implement an equity project in one of five major topics -- epidemiology and birth outcomes and racial disparities, evidence-based interventions for vulnerable populations, racism and inequalities in birth outcomes, leadership, and evaluation. The second phase of the educational course, project development, has teams working together to assess local capacity, examine local data, and design and implement their respective project. Finally, in the sharing summit, efforts are combined in face-to-face Equity Institute training, online curriculum and webinars, and mentoring relationships between public health experts and community health workers and stakeholders; here, the Ohio Equity Institute shares findings and results.

Reproductive Health and Wellness Program

The Reproductive Health and Wellness Program “comprehensively addresses issues of reproductive health and wellness...with a focus on populations in the greatest need and identified priorities” to improve the overall health and well-being of women and men by promoting health lifestyles and encouraging the establishment of a reproductive life plan (Ohio Department of Health). Reproductive health clinics often serve as the entry point for healthcare, especially for underserved and uninsured women, so services offered through this program in Columbus are broad-based, voluntary, and private to plan a healthy pregnancy, screen for diseases and health conditions, improve pregnancy outcomes, and improve the health of mothers and babies. Uninsured and underinsured people with low incomes are prioritized and fees for services are based on family size and income; nobody is denied services if they cannot pay. The

program is primarily funded through the Federal Title X of the Public Health Services Act, Maternal and Child Health Block Grant, and general revenue funds.

Utah Maternal and Child Health Handbook

The maternal and child health handbook is a way for mothers, in particular, to track and maintain a more active and participatory role in the growth and development of their infant, from conception to their early childhood through health records, instructional guides, and tracking of essential health information that both the parents and medical professionals can observe and complete. The use of the *Boshi Kenko Techo* is increasing throughout Asia, with Japan at the helm of the public health intervention. In 1987, Utah introduced a Maternal and Child Handbook, renamed the *Health Keepsake: Baby Your Baby*.

The approximately sixty-page journal is split into two sections with the first designed for the mother and the second for the baby. It is not meant to be a complete health record nor take the place of medical advice. The booklet includes spaces to record health information and thoughts and feelings throughout the pregnancy and birth outcomes with advice for maternal and paternal family histories and previous health examinations or information. It also offers advice for eating healthy with tips for food safety and weight gain recommendations and information based on maternal body mass index. Further chapters have information about when and how to receive prenatal care with suggested questions to ask and what to expect for the mother and child in the hospital after the delivery. In the baby-related section, the handbook has sections to fill out for fetal behavior, including the number of kicks, labor and delivery, ultrasounds, and baby developmental milestones. It also has suggestions about and timelines for feeding history, vitamins, healthy teeth, and child development, as compared to normal growth and development. Finally, the handbook offers advice for choosing quality child healthcare and well-child visits, home safety checklists, a record of illnesses and immunizations charts, and a questionnaire to complete when the infant reaches eighteen months of age. As of 2008, this Utah program was the only one in the United States that paralleled the mission and results of the maternal and child health handbook in Japan. “One year after the program was initiated, Utah recorded the largest decrease in the [infant mortality rate] in state history (from 8.8 to 8.0 per 1,000 live births)” (Takeuchi et al., 7).

XII. FRANKLIN COUNTY POLICY FACTORS

Impacts of Public Health Investments

American health economics experts estimate that a 10% increase in a state’s investment in public health institutions can lead to a 6.9% decrease in said state’s infant mortality rate (Barnett and Reece, 12);

however the state of Ohio has increased its per capita public health spending since 2009, but still persistently ranks seventh lowest on the list of public health spending per capita. In infant mortality, Ohio ranks 46th out of fifty states; Franklin County ranks 71st out of the 88 counties in Ohio, which is consistently worse than that of the state or of the nation as a whole, and Columbus ranks 36th out of the fifty largest cities in the United States (City of Columbus City Council). Rates of precursors to infant mortality, or infant death itself, in Columbus are largely affected by an “unjust distribution of conditions that support health -- the social determinants of health” and prematurity or sleep-related causes are especially worse for blacks (City of Columbus City Council). Barriers to the necessary “life-enhancing resources” increase the risk of losing a child before their first year of life.

Evaluation of Previous Efforts in Columbus

Previous efforts to reduce infant mortality through medical care and prenatal care, specific case management, and care coordination interventions focus on only a few of the proximate, underlying causes and may ultimately be “too little, too late” to improve maternal and child health overall (Health Policy Institute of Ohio). Therefore, any recommendations, including those at the culmination of this paper, must be cognizant of population-level, distal factors that play into how infant mortality is distributed and potential ways to improve such rates.

Neighborhood Effect Theory

There is a theory known as the neighborhood effect which postulates that neighborhoods can have a direct or indirect effect on individual behaviors and health, and because neighborhoods are based in large part on historically racially-biased policies, the outcomes of black health are based on the community in which that individual lives, works, and engages (City of Columbus City Council). In Columbus and across the United States, African-American women, women with a low education level, especially those with less than a high school degree, and unmarried women are at the greatest risk for infant mortality; confluence of these factors can increase the risk even further. Underlying causes of racial disparities are, thus, multifaceted and not fully understood. Exposure to various protective or risk factors across one’s lifetime can shape birth outcomes and these factors can be contributed to complex interactions between and across the social determinants of health to ultimately drive inequities that can accumulate over the life course of the mother and her infant. Because of historically racially-biased laws and practices, African-Americans tend to be more likely to be exposed to unhealthy environments that result in poorer health outcomes.

Greater Columbus Infant Mortality Task Force

The hotspot process led by Jason Reece and David Norris identified areas that comprise less than 10% of Franklin County's births and nearly 25% of its infant deaths and over 30% of minority infant deaths. As a result, the Greater Columbus Infant Mortality Task Force was introduced and is described by former Columbus Mayor Michael Coleman as a "diverse coalition of community leaders to turn the tide of infant deaths by reducing the infant mortality by 40% and cutting the racial disparity in half by 2020...we must be bold to achieve our vision of a community where all children thrive in their first years of life and where health is not determined by race or ZIP code." It was recognized that there is a need for a "robust community engagement effort" to educate and gain insight into local barriers and possibilities for change. The Greater Columbus Infant Mortality Task Force is designed around the life course approach, which proposes that prior to having healthy babies, one must have healthy families and live in healthy communities, as the foundation for a healthy life from this generation onwards. In essence, one cannot have healthy babies without also having these prerequisites. These factors parallel the social ecological model used in this thesis as both recognize the longitudinal impacts of factors at every stage in a community or society, such that one's inclusion and engagement with those factors predispose them to health outcomes. The task force engages and mobilizes local initiatives and projects to improve socioeconomic conditions that can drive disparities, especially in the highest risk communities. The task force has seven main goals with suggested approaches -- to improve women's health before pregnancy by enrolling them in private or public health insurance plans with a focus on preventative care; to improve reproductive health by promoting family planning and increased access to and use of contraception; to improve prenatal care services and access or capacity for the highest risk women; to ensure the highest standard of quality for perinatal care by increasing access to progesterone, decreasing early-elective deliveries, and ensuring neonatal intensive care quality; to reduce maternal and household smoking and to enact smoke-free policies in multi-unit housing; to promote infant safe sleep through education and access to cribs for low-income families; and to create a collective impact and accountability structure to support strategy implementation and goal attainment. Each of these function under a main goal of and for community engagement, which tries to generate awareness of infant mortality rates, and their corresponding challenges in Franklin County, to reinforce the community's responsibilities, and to engage appropriate stakeholders and key players. These approaches require the mobilization of traditional and social media, educational and awareness websites and other mediums, community presentations, and targeted stakeholder workshops.

The framework and organization of the four main umbrella goals revolves around concerns from the community that were raised in community forums and conversations. As the City of Columbus City Council writes, “insights offered by hundreds of Franklin County residents will be vital to efforts beyond the work of the Task Force.” The first goal -- improvement of health services and deliveries for women and children -- had five main community concerns. In regards to the lack of health education policies for middle schools, the task force suggests creating educational guidelines that cover topics such as sexual and mental health, self-esteem, healthy relationships, and nutrition. Community members were also concerned about the insufficiency of family planning resources and the task force listed its subsequent objective as easier access to family planning services, improvement in baby care education, providing a comprehensive health guide and booklet, rather than individual pamphlets -- mirroring the Japanese Maternal and Child Health Handbook. Because women are facing chronic mental health and physical health issues and drug abuse before, during, and after pregnancies, the task force focuses on decreasing obesity, diabetes, and smoking rates, particularly for expecting mothers. The task force will also improve prenatal access, especially during the first trimester, by raising awareness about Medicaid eligibility and reducing telephone wait times to access enrollment in programs for prenatal care because pregnant women are not accessing prenatal services early enough, if at all, and mothers, especially adolescents, do not receive encouragement or support, so the task force works towards providing nurse navigators and social workers for the most high risk pregnancies and engage family members by providing home visits and systematic programming to reinforce the basics of caring for an infant and child.

There were four specific objectives under the main goal of fostering greater coordination and collaboration across key stakeholders. One of the main community concerns was that too many programs and doctors are isolated and, as a result, are delivering contradictory or repetitive information, so the task force suggests creating a central monitoring system that monitors and surveils programs and participants enrolled or participating in each one; by doing so, they can track health information and their respective audiences to make an effort to unify the messages and find gaps. Similarly, the task force proposes creating a centralized referral system that will help health workers identify the programming that will be best for a family’s needs, because community members were simultaneously concerned that collaboration was not reaching the institutional or leadership level. The task force also suggests linking finances and funding to successful outcomes, rather than moving away from competitive grant-based funding, because there is a lack of data for the audiences of each programs. The last objective under this main goal -- that healthcare professionals are not aware of the breadth of available services in the communities -- lacks

directly proposed solutions, but perhaps will be ameliorated indirectly by efforts and improvements in response to other community concerns and outreach to professionals in the medical institution.

The third goal, addressing distal issues that extend beyond infant mortality, has six core constituents that fall under it -- poverty and employment, education, transportation, neighborhood safety, affordable housing, and access to healthy foods. Because poverty, employment, and education are distal and often serve as the backdrop or pathway between women and their likelihood of infant mortality, there weren't any specific recommendations on behalf of the task force, though because these concerns are so far-reaching, there is the chance that they or their reach will be improved through responses to other community concerns. The task force suggests improving transportation options by offering safe and convenient ways to not only get to doctors' appointments, but to get to the grocery store and places of employment; one recommendation is to realign bus routes or introduce new routes through low-income housing and neighborhoods. In response to concerns about neighborhood safety, the creation of one-stop locations for comprehensive services that extend beyond maternal and child health could work to ameliorate the situation and respond to concerns about safety coming to and from doctors' appointments. The development and construction of more affordable housing options could make such housing, and the subsequent access, resources, and networks, available to more diverse and underrepresented populations, in better communities with greater access to opportunities. Finally, nutrition is crucial for the healthy growth and development, both cognitively and physically, of children, and as a result, is a critical matter for the task force to address. Many low-income neighborhoods lack access to healthy foods, and therefore, nutrition becomes difficult to obtain and maintain. Generating more opportunity for fresh, organic, and culturally sensitive food availability, within walking distance for families, and providing education for food preparation and care will adequately respond to this community priority.

There are six arms of the last objective to build and foster community trust and engagement with community leaders. The lack of knowledge of available health programs that community leaders can direct populations to can be ameliorated through the development of a sustained educational and awareness campaign. At the same time, many health materials utilize complex language that few people, those possess comprehensive health literacy, can fully comprehend, so any messages moving forward should be published in a simpler and lay language that is easier to understand and culturally competent for specific audiences. While overwhelming amounts of information that can be too much to process was a concern, there was no directly proposed solution, so work to improving health messages through other means could simultaneously, indirectly improve the complexity of health information. A common

community concern was the shame and lack of support and encouragement for expecting mothers, especially for pregnant adolescents, so a neighborhood-based peer-to-peer mentoring program could foster connections between pregnant community members and community leaders. There is often too little outreach to and education for grandparents, caregivers, and other family members about how to support new mothers, especially single ones, so providing accurate and consistent messages to these family members and supports can improve the relationships between new mothers and their networks. Community leaders, particularly religious leaders, are extremely respected in neighborhoods, so taking advantage of existing infrastructure, advice, and capacity in faith institutions can be a potential solution for the tendency to dismiss information delivered in a clinical setting, especially when that information conflicts with information delivered from a trusted source. This may explain part of the logic behind incorporating the Mt. Olivet Baptist Church senior pastor in the CelebrateOne executive committee.

Health Policy Institute of Ohio

The Health Policy Institute of Ohio found that, “community conditions for low-income, African-American, and rural families in Ohio are particularly challenging” and as a result, policy should prioritize the improvement of various and specific community conditions. The Institute has eight recommendations revolving around community mobilization and community health prerequisites to infant mortality: “to prioritize housing and employment” as they are basic tenets to health and foundational human needs; “to connect the disconnected” to transportation, post-secondary education, jobs, and social support; “to ensure all children have the opportunity to thrive” by expanding early childhood programs, decreasing disparities in education, and preventing violence; “to acknowledge and address the roles of racism, discrimination, violence, and toxic stress”; “to innovate, leverage public-private partnerships, and join forces across sectors” as new financing and collaboration between new partners is critical; “to coordinate, collaborate, monitor, and evaluate” partnerships across policymakers and state agencies to develop, document, and assess infant mortality efforts; and “to balance short-term fixes with longer-term change” as any action will take place across a continuum of factors, time periods, and ages.

Senate Bill 332

Senate Bill 332 in the Ohio Legislature 132nd General Assembly, *Implement infant mortality recommendations*, was comprised of several specific recommendations for state agencies and legislative bodies to reduce infant mortality, to acknowledge the importance of reducing racial disparities, and to review state policies and programs that impact the social determinants of health for infants and women of childbearing age. These recommendations fall under four umbrella policies -- education, public

transportation, housing, and employment opportunities and access. There are a variety of motivations and societal dynamics behind each of the four foci addressed in the Senate Bill 322.

The lack of education hinders the ability of individuals to find employment with sufficient compensation to support basic necessities, which parallels to the needs and disparities in the employment opportunities and access objective. As the level of education increases, so does the level of health literacy; more knowledge leads to a better understanding of how to be healthy and maintain that state and how to navigate the healthcare system. Education often fosters social capital and stronger social connections reflect the degree to which a person is socially-integrated within a community, which is associated with greater levels of social support and other protective health factors. Finally, increasing high school graduation rates through programs for the students at the highest risk, strengthening career and technical educational programs, and reducing financial barriers for post-secondary education are all aspects of the overall objective that can be addressed in this bill. As examined, education can decrease one's risk for infant mortality and reduce the adolescent pregnancy rate through providing avenues for self-improvement and extracurriculars.

Transportation revolves around the ability of transport networks to improve access, safety, and quality for community members. The ability to obtain and access healthcare, jobs, schools, child care support, social services, grocery stores, parks and other outdoor locations, and libraries can have a great impact on the health behaviors, access to care, and health outcomes of the populations that previously lacked increased access to these community locations. Walking, biking, and using public transit all improve physical activity and environmental conditions; active transportation infrastructure includes features such as sidewalks, curb ramps, crosswalks, and multi-use trails and paths. Subsequent to this goal, air quality and air pollution -- both linked to negative health outcomes -- would decrease with greater physical activity and increasing public transit usage, especially with cleaner and more efficient vehicles. Expanding bus systems, improving pedestrian safety, and evaluating the efficacy of the Medicaid Non-Emergency Medical Transportation program, which offers transportation options to Medicaid beneficiaries to medical services from local or tertiary providers without copayment in Ohio (Kaiser Family Foundation), will all address and ameliorate a particular facet of the transportation objective.

The affordability, segregation, stability, quality, and neighborhood in which one's house is built each address a specific dimension of the overall impact housing has on human health, and as a result, infant mortality. High housing costs, in addition to predatory landlords, and the threat of eviction, make it more

difficult for low-income families to pay for other necessities, especially those which play either an indirect or direct role in health outcomes, like transportation, food, medical care, and medications. Historical policies have birthed residential segregation, in which low-income and minority-dominated neighborhoods overlap, resulting in deteriorating conditions in segregated communities and exposing residents to poor housing conditions, high poverty, and undue levels of violence, while isolating minority communities from mainstream and potentially protective resources. Housing instability leads to poor health and disrupted access to healthcare, while simultaneously increasing the need for it; mental and physical health problems stemming from accidents and exposure to harmful contaminants are attributed to poor housing quality. Poor neighborhood conditions lead to inadequate access to healthy foods, safe places to exercise, sufficient professional and safe jobs, and strong social capital precipitate poor mental and physical health through poor nutrition, lack of physical activity, increased chronic stress, and a lack of social networks to alleviate mental health conditions. Increasing rental assistance programs, reducing structural barriers to affordable housing, and improving the coordination of services upon the housing continuum for low-income families can ameliorate not only housing, but health outcomes as well.

Employment and income affect access to healthy foods, safe housing, quality education, healthcare, and health-promoting behaviors and resources; having a low income often precedes poor health outcomes, especially those related to stress. At the same time, the type and environment of work and the level of flexibility that employees have influence overall health, primarily through work-related discrimination and work-related stress mechanisms, in that persistent stress can engender poor mental and physical health outcomes. Physical demands of strenuous work increase the risk of illness and injury. Employment policies and benefits can act as either a health-promoting or health-hindering mechanism that influence not only the health of employees, but that of their children and family members through access to healthcare services. Increasing incomes for pregnant women and parents of young children and providing extended maternal or paternal paid leaves, reducing unemployment and underemployment rates, improving access to support systems, adopting more robust and beneficial leave policies, and decreasing exposure to work-related stress will serve as solutions for the employment-related problems at hand and at play in infant mortality.

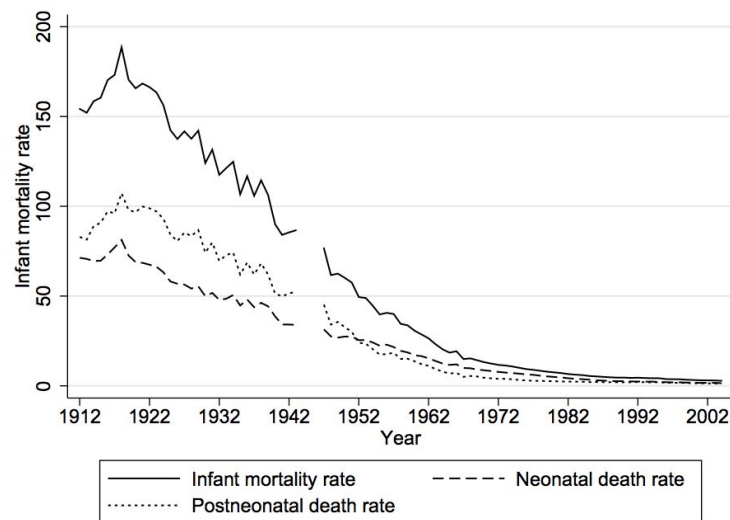
XIII. INFANT MORTALITY IN TOKYO

Infant Mortality National History and Trends

Between 1892 and 1900, Japan's infant mortality rate was relatively low when compared to other Western countries, however, during this time, rates continuously declined in other Western countries, while it rose

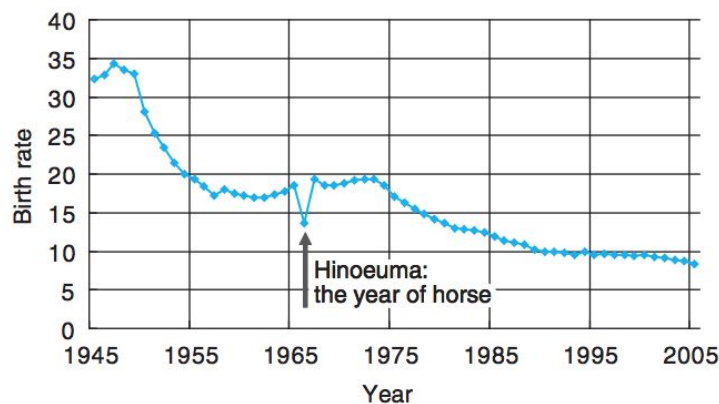
in Japan until the 1920s. Since the 1920s to 1930s, when Japan began industrializing, there has been a steady and continuous reduction in the infant mortality rate. In the 1930s, Japan entered a huge financial crisis and the infant mortality rate was 125 deaths per 1,000 live births and mothers and children were in dire need of assistance and intervention (Hirayama, Oyama, Asano, 579). In 1947, Japan's infant mortality rate had decreased to 76.7 deaths per 1,000 live births, even in the midst of social chaos, poor economic conditions, and a lack of stable and nutritious food sources, shelter, and sanitation in the aftermath of World War II (Leppert). At the same time, the Japanese under-five mortality rate had decreased from 1948 to 2014; inter-prefecture differences remained low after World War II, but began increasing in the 2000s. Disparities and inequities in child health are widening and increasing, respectively, which may be attributed to increasing socioeconomic differences: as *Pediatrics International* writes, Japan, which was "once known as an egalitarian country, [now] has inequity in children's health" (820). There was a sharp increase in the under-five mortality rate in 2011, after the Japanese earthquake; this trend is repeated for all months and years in which there was a major natural disaster or earthquake.

Figure 1: Infant mortality rate in Japan



Historical infant mortality rate as a summation of postneonatal and neonatal death rates (Ogasawara).

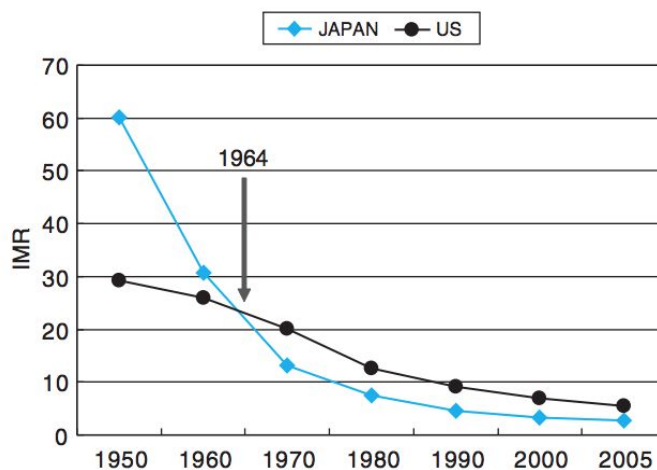
The total fertility rate pre-World War II was 5.11 per 1,000 women and fluctuated significantly after the war due to various population-control policies (National Institute of Population and Social Security Research). The under-5 mortality rate has decreased by 52% since 1990 and by 33% since 2000 (UNICEF). The infant mortality rate improvement since 1925 is significant and striking, with the sharpest decline in total fertility was observed in 1966, which was the *Hinoeuma*, or the Year of the Horse (Ministry of Health, Labor, and Welfare).



[Source: Ministry of Health, Labour, and Welfare, Japan.]

Historical infant mortality decline in Japan from 1945-2005, indicating the Hinoeuma (Ministry of Health, Labour, and Welfare).

Japan's infant mortality rate decline happened later than European countries, but at a faster rate -- the nation accomplished in less than twenty years what took Western European countries like France, Italy, and the United Kingdom twenty years; researchers have connected this rapid reduction to significant improvements in the standards of living, the efficacy of improvements in individual and community hygiene, and the efficacy of public health interventions.



[Sources: U.S. Department of Health and Human Services; Ministry of Health, Labour, and Welfare, Japan.]

Comparison of the historical infant mortality decline in United States and Japan from 1950-2005 (Ministry of Health, Labour, and Welfare).

Before the national decline beginning in the 1920s, infant mortality rates were higher in urban areas than rural areas; parallel to the overall decline, this disparity also abated, although the speed of decline in the urban infant mortality rate exceeded the speed of rural rates (Ogasawara, 177). The city-region of Tokyo

has the highest birth rate in Japan and serves as a hub in the global economy of transnational corporations, financial services, and information exchange.

American healthcare professionals attribute Japan's low infant mortality rate to the relatively homogenous and highly educated population, access to quality and universal medical care, and a higher abortion rate. In a study published in the *American Journal of Public Health* by Victor G. Rodwin and Leland G. Neuberg, the major metropolises of London, Paris, and Manhattan all supported the hypothesis that with a fixed birth rate, shifting a neighborhood out of the lower-income quartile lowered its infant mortality rate. Tokyo was the only city in the study with no correlation between low-income neighborhoods and infant mortality rate. However, since these data were ecological, no causal conclusions can be drawn about this relationship between community income and infant mortality. In developed or wealthy countries, lowering the infant mortality rate was an important challenge during times of economic development; longitudinal analysis and evaluation of these countries can provide literature and prototypes for currently-developing countries. As is recognized, economic developments and health outcomes are closely and symbiotically interrelated -- the improvement of conditions that promote or safeguard health is a necessary prerequisite for economic development and health impacts the economy through the accumulation of human capital (Ogasawara, 171), or the skills, knowledge, and experience possessed by an individual or a population in terms of their *value* to the overall society.

Japanese Social Support and Healthcare Systems

While American healthcare and related interventions are said to be more individualistic, without deeper consideration of one's family or social network, Japanese society provides community health-focused comprehensive and intensive support to youth populations, including both medical and social assistance. There are many paradigms of a more community-based and traditional healthcare culture and infrastructure in Japan: for example, the childbearing tradition of *kodakara* signifies that each child is a gift from the heavens and the community must therefore treat it as a treasure. The Japanese Maternal and Child Health Laws set national standards for maternal and child healthcare policies and defines the responsibility of local and national governments towards mothers and children. The universal use of the *Boshi kenko techo*, or the comprehensive maternal and child health handbook, instructs mothers to record health information about the pregnancy, how to live a healthy lifestyle by promoting focus on nutrition, daily exercise, and the environment, and reminds her of appropriate timing for immunizations and developmental milestones. Finally, the Love District Group (*Aiiku Han*) consists of neighborhood volunteers and housewives who assist with health education and promotion in their communities as a part

of a network of public health community leaders that disseminate health information and encourages enrollment in prenatal care and other practices (Leppert).

Several health insurance programs comprise Japan's universal health care system. The Employees' Health Insurance covers 60% of the population with eight categories of care and the National Health Insurance covers an additional proportion. Government subsidies are offered for certain maternal and infant health complications. Care can be given in public hospital or private clinic settings, and 99.7% of births were in these public or private locations, with access to doctors and trained midwives (Leppert). Traditionally, the mother and child stay in the clinic and hospital for a week postpartum, where neonatal intensive care is technologically advanced and the staff is well-trained.

Japanese physicians complete nine years of compulsory education, three years of upper secondary school, and six years of strict medical education, although few doctors are trained as maternal-fetal subspecialists and OB-GYNs are considered generalist doctors (Leppert). Japan maintains a sophisticated system of perinatal care referral centers and a rigorous course selection in obstetrics and gynecology. Japanese midwives complete the same nine years of compulsory education as physicians, but spend four years in a college or university or three years in a nursing school, and one additional year in midwifery school. Nationally, there has been a reduction in the number of midwives, as older midwives are retiring at a faster rate than they can be replaced (Leppert). In addition to administering standard medical care and aiding in the birthing process, midwives also teach birthing classes, nutrition and breastfeeding programs, and contraceptive counseling.

Pregnancy Trends

Almost all pregnancies happen to women between the ages of 25 to 34 and the majority of these fall between the ages of 25 and 29, when the risk of infant mortality is the lowest (Leppert). There are very few teenage pregnancies due to a prevailing societal attitude that the child is essentially sacred, which fosters a psychosocial climate that discourages teenage childbearing, and to the fact that education is a high priority for both male and female adolescents. In fact, Japan has the lowest teenage pregnancy rate among developed countries (UNICEF: The Progress of Nations 1996). Secondary school-equivalent students are in class, extracurricular activities, or tutoring sessions six days a week, which leaves very little time for sexual experimentation. Only 0.9% of the births in 1982 were to unmarried mothers (Leppert); most women delay marriage, and therefore childbearing, until their education is complete or their career advancement is satisfactory. Japan is a very traditional society wherein family is highly

valued and unmarried pregnancy is highly stigmatized by a majority of the population. Breastfeeding is respected and accepted by society with no stigma attached to the practice -- 80% of Japanese babies aged two to three months receive some level of breast milk. The most common contraceptive methods are the rhythm method (a natural form of birth control that limits sexual intercourse to times in a woman's menstrual cycle when ovulation is least likely to occur) and condom use. Access to induced abortion when contraceptives fail is easily facilitated and relatively unopposed; in 1985, the ratio of abortions to births was 385 to 1,000, though the incidence rate among teenagers and unmarried women is not high -- most abortions occurred in subsequent pregnancies due to contraceptive failures (Leppert). Part of the orthodoxy of abortion in Japanese culture is an overwhelming cultural understanding that the fetus does not have a "soul"; thus the rhetoric that abortion equates to murder is not as severe as it is in the United States.

XIV. TOKYO INDIVIDUAL FACTORS

Socioeconomic Status and Infant Mortality

There is a significant association between socioeconomic status, self-reported health, and health outcomes, morbidity, mortality, and health behaviors in Japan. Sugisawa et al. found that variations in health differences related to socioeconomic status were identified according to age, period, and cohort and that differences in self-reported health associated with income differences decrease with age, through what is known as the age-as-leveler theory of health differences, in that "the decreased association between [socioeconomic status] and health later in life can be explained by selective mortality and biological frailty. Higher levels of education are associated with higher mortality among Japanese individuals over the age of eighty when compared to individuals between the ages of sixty and 69, it is possible that a "crossover of income differences in self-reported health" is observed around eighty years of age (Sugisawa et al., 7). Ultimately, self-reported health income-related variance decrease with age, which may support the conclusion that infants (comprising the youngest age cohort) may have health differences crucially correlated to income, regardless of country, as this trend is observed in Columbus, Ohio, as well. This could be an example of how infants are more vulnerable to their environment and surroundings than any other age group.

Prematurity

Rates of preterm birth are increasing in a number of countries, both developed and developing, around the world. Preterm birth represents a significant public health issue as it demands higher medical care expenses in response and is a major cause of infant mortality and poor infant development. Children born

before 34 gestational weeks have a higher risk of earlier death and lifelong morbidity than children born after 37 weeks. In Japan, rates of preterm birth were higher among mothers with less than twenty years of age and older than their mid-thirties, as compared to those in the intermediary; this trend is parallel to what is observed in the dynamic between maternal age and birth-related health outcomes (Sakata et al., 392). Historically, preterm birth rates in Japan have been *decreasing* for mothers younger than twenty and older than their mid-thirties, while they have been *increasing* for mothers between these age quartiles.

For younger mothers, this rising preterm birth rate could be attributed to maternal undernutrition before and during pregnancy, the increasing proportion of pregnant women continuing to work for longer durations into their pregnancy, changing clinical practices related to labor induction, and cesarean section at earlier stages of pregnancy. A study in the Toyama prefecture, to the northwest of Tokyo, found that part-time work was associated with a higher risk of birth at less than 37 gestational weeks (Sakata et al., 394). The decline in preterm birth for older mothers can be attributed to improved conditions during pregnancy and lowered rates of obese and overweight women, but the increase in the preterm birth rate could be ascribed to the increasing age of mothers at delivery and a higher proportion of firstborn children; these factors can be considered a function of Japanese women delaying their childbearing years in order to pursue higher education or their careers.

Low Birth Weight

Japan has witnessed an increase in the number of low birth weight infants: nationally in 1975, 4.7% of male births and 5.5% of female births were of a low birth weight, while in 2003, 8.1% of male births and 10.1% of female births were of a low birth weight (Suzuki et al., 745). Reduced birth weight is associated with neonatal morbidity and mortality and long-term health conditions; this recent increase in low birth weight prevalence could pose a significant socioeconomic burden in the future, despite the low infant mortality rate, as it will pose greater costs and barriers to the national health system. Low pre-pregnancy maternal body mass index and insufficient weight gain during pregnancy is correlated with preterm birth, low birth weight, and low fetal growth (Takemoto et al., 4).

Risks of low birth weight and prematurity increase with age, with a dramatic increase among women greater than 35 years of age. Across all age groups, low birth weight is increasing over time, though the prevalence is greater for mothers older than 35 years of age than mothers of any other age group (Takemoto, 4).

Prevalence of LBW infants according to maternal age (%)				
	1979	1990	2000	2010
Age <25 years				
<1.0 (kg)	0.06	0.16	0.18	0.26
<1.5	0.29	0.48	0.49	0.58
<2.5	5.04	6.48	7.73	8.25
Age 25–34 years				
<1.0 (kg)	0.07	0.13	0.17	0.21
<1.5	0.28	0.39	0.45	0.50
<2.5	4.14	5.22	7.14	7.93
Age ≥35 years				
<1.0 (kg)	0.19	0.31	0.29	0.37
<1.5	0.76	0.84	0.82	0.90
<2.5	7.44	7.17	8.53	9.51

Table 2. Prevalence of LBW infants according to maternal age.

Prevalence of low birth weight of infants correlated with maternal age categories (Takemoto, 3).

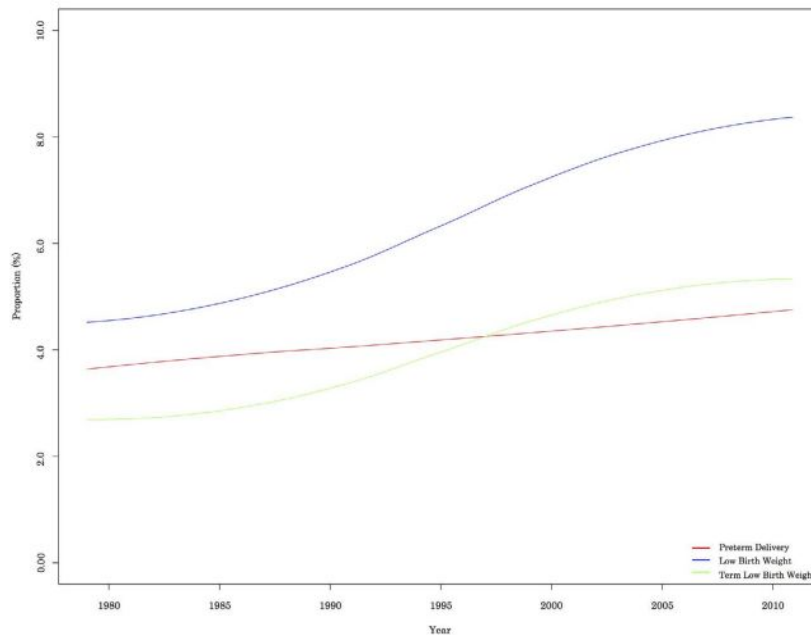


Figure 2. Secular trends in prevalence of preterm, LBW, and term LBW infants.

Longitudinal trends in low birth weight infants, premature infants, and low birth weight infants born full-term (Takemoto, 3).

There has been a dramatic increase in the proportion of mothers over age thirty-five with a low birth weight infant: from 4.2% in 1980 to 23.8% in 2010 (Takemoto et al., 5).

Maternal Age

In high-income countries, advanced maternal age is common and increasing; women pursuing higher education and career advancement delay both marriage and childbearing; these often go hand-in-hand in Japanese culture as there is a prevailing stigma against children born out of wedlock (Uchida et al., 3). Japanese technological achievements, including increasingly effective birth control methods and advances in assisted reproduction, have enabled this postponement. In Tokyo, women are delaying childbirth and women in this prefecture are more likely to postpone marriage, get a divorce, and have fewer children than their rural village counterparts. In 1991, the average age of marriage for a woman was 25.7 and 27.3 for women with a college degree (Kumagai, 156); women are now delaying marriage and childbirth until their thirties. Correspondingly, the Japanese Gynecological Association has modified its definition of *kōrei shosanfu* (a woman having her first child at a later age) from thirty to 35.

Maternal age is an important determinant of birth outcomes and extremely low or high age is associated with lowered fertility, stillbirths, chromosomal abnormalities, multiple gestations, and abortion. Japan, however, has the lowest rate of teenage births observed in the industrialized world. Adolescent pregnancy is recognized to have far-reaching consequences: “[adolescent] mothers face higher risks of complications in childbirth and their infants are at greater risk of prematurity, low birth weight, death in the first year of life, and developmental problems” (Latest from Japan). Becoming pregnant at a young age can have implications for the mother, as well, as it affects her economic and educational opportunities and Japanese sociologists elaborate that the family life of the mother and child will be marked by poverty, poor healthcare, and instability and that these problems will perpetuate generationally.

Maternal Tobacco Smoking

Maternal smoking is one of the biggest factors correlated to low birth weight, low gestational age, intrauterine growth restriction, and preterm birth. Low socioeconomic status, pregnancy-induced hypertension, pre-gestational maternal body mass index, and insufficient weight gain are all risk factors, but “after controlling for partners’ smoking status, annual household income, birth order...maternal weight before pregnancy, maternal weight gain during pregnancy, maternal age at delivery, and gestational duration, maternal smoking status during pregnancy was significantly associated with birth weight” (Suzuki et al., 373). Smoking in expectant mothers can lead to effects in the placenta, a reduced placental size, and can reduce birth weight from 124 grams to 136 grams.

According to statistics released by the Ministry of the Environment, 10% of expecting women under age 24 in Japan continue smoking into the pregnancy. 63% of women's partners also smoked and their smoking habits during early pregnancy were strongly associated with maternal smoking during early pregnancy. Therefore, it is important for both women and their partners to quit smoking. Smoking prevalence was lower in rural areas than the national average, while the prevalence in urban areas exceeded that of Japan overall. Older women are beginning to quit smoking after getting pregnant and the maternal smoking rate nationally dropped to under 4% for women over age forty. In the United States, the maternal smoking rate has decreased from 19.5% to 11% from 1990 to 2003, while in Japan, the maternal smoking rate has increased from 5.6% in 1990 to 10.0% in 2000 (Suzuki et al., 745), while the number of young Japanese women who are likely to smoke as also increased. Both the duration and frequency of maternal smoking during pregnancy were positively correlated with childhood obesity and other poor health outcomes.

Because all women in Japan, regardless of their nationality, are required to register their pregnancy with the local municipal office, this location presents an ideal location for anti-smoking interventions, and activists have taken advantage of this suggestion. "Maternal smoking during early pregnancy was found to be associated with late pregnancy registration...[or] with a negative attitude toward pregnancy and unintended pregnancy" (Suzuki et al., 749). Late registration, therefore, can be due to an unwanted pregnancy or unawareness of pregnancy, as "the association between unwanted pregnancy and preterm birth can be confounded by maternal smoking during pregnancy" (Suzuki et al., 749). The researchers suggest that since almost all pregnant women are required to register their pregnancy at a city office when their pregnancy is confirmed, "smoking cessation interventions are best targeted at the time of the registration" (Suzuki et al., 746). Monitoring pregnant women with smoking partners or those who have registered their pregnancy after twelve gestational weeks, as an indicator of ambivalence or dislike towards the pregnancy, is important to reduce the maternal smoking rate.

XV. TOKYO INTERPERSONAL FACTORS

Cultural Understandings

Japanese culture has three proverbs and phrases that describe and apply to how the infant is introduced and understood in Japanese society. *Mitsugo no tamashii hyakumade* roughly translates to the idea that the soul of the three-year-old child remains the same and unchanging until age one hundred; it reflects the cultural understanding that characteristics one acquires when one is young remain the same until one dies and expresses the importance of child-rearing experiences (Kazui, 486). This maxim was especially

poignant when infant mortality rates were extremely high in the country in the 1920s and 1930s. The second saying, *3 saifi shinwa*, means the myth of the three-year-old, in that a child raised by its own mother until three years of age has a stronger bond with the mother and will be healthy in the body and mind. “If children are not raised by their own mothers and lack this bond, they are said to become unbalanced and disadvantaged emotionally and physically” (Kazui, 486). Finally, *bogen-byo*, or mother-rooted sickness, refers primarily to the maternal figure over the child, as opposed to the other proverbs (Kazui, 489). It reflects the cultural understanding that childhood illness, refusal to go to school, autism, and asthma were created and maintained by poor motherhood and child-rearing, thus putting the blame for perceived poor childhood behavioral and health indicators on the mother.

Japanese and American Practices

77.9% of Japanese parents and 42.6% of American parents believe that child-rearing is primarily women’s work (Kazui, 487); Japan tends to be considered a more traditional society than other developed countries. The Meiji civil law of 1890 declared that all Japanese families must follow a strict patriarchy and confined women to the home such that their main function to raise a son to continue the family lineage. Women’s reproductive ability was “their sole qualification to secure a permanent position in their family into which they married” (Kazui, 487). Success was defined for the male family member on an income scale, while success for a woman was dependent on her being a good housewife and mother. These cultural trends and patterns probably strengthened the maternal tie to her children, because they could be viewed as her only allies in the family institution. At the same time, the child’s success and health throughout their development and adulthood is believed to be directly tied to the maternal relationship and child-rearing ability. A main source of maternal stress in Japan is likely to manifest in stress about the child’s condition, development, and functioning, rather than their mother’s own personal problems (Kazui, 488). Levels of child-related stress have been found to be higher for mothers of young children because once these children become older and enter preschool or higher educational settings, mothers have more available free time to focus on their own problems and concerns, and produce stress as a result of this dynamic, rather than due to perceptions of their child. However, healthy marital relationships may help ameliorate this stress incurred by mothers (Kazui, 493).

The family process is one of the most critical factors for the formation of one’s behavior. The Family Environment Scale, published originally in 1974 and later in 2002 by Bernice S. and Rudolf H. Moos, is a measure that consists of ten subscales: cohesion, expressiveness, conflict, independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, moral-religious emphasis, and

control. While the American mother tends to have a “more lively and stimulating approach” to her baby, the Japanese mother is more present with the child and is “more soothing and quieting” (Nomura et al., 61). “The American baby is found to be more physically active and happily vocal and more involved in the exploration of his/her body than the Japanese baby” (Nomura et al., 61). The mother’s communication is interpreted differently in both cultures: American mothers’ voices are associated with happier tones, while Japanese mothers’ are more associated with unhappier vocals. These cultural differences manifest in different interpretations of a “good child.” In the United States, children who are more courteous, assertive, and social are viewed as “good children,” while in Japan, children who are obedient, self-controlled, and mild-mannered are more likely to be understood in this way. Americans value self-reliance and individualism more than Asian cultures; an achievement-orientation, considered an individualistic quality, is much more strongly correlated with American families, while cohesion was more strongly consonant with Japanese families.

Maternal and Child Health Promoters

Because Japan is a very social and symbiotic society, community participation is a key factor in the development of a child, regardless of whose family in which they are a direct nuclear member. *Aiiku Han Ins* are maternal and child health promoters in Japanese municipalities whose role is to spread health information and knowledge and serve as the liaison between government health policy and community members (Hirayama et al., 579). Volunteers form a pipeline between midwives and the formal medical institution and expecting women. The foundation of the group dates back to 1933 with a voluntary group of housewives. *Aiiku Han* prioritizes the promotion of health and welfare and the prevention of disease for mothers and children before, during, and after pregnancy and birth. In a study conducted in Vietnam, pregnant women receiving the *Aiiku Han* intervention activities had “more knowledge concerning health issues...performed more health-seeking behaviors, and received more support from family members...they also referred to midwives for counseling and information more often, and were more likely to relieve their anxieties by consulting with midwives” (Minamishima).

These informational, educational, and communication activities were promoted and participated more often in intervention areas than non-intervention communities. Pregnant women were able to gain more knowledge and strengthened their health behaviors and family support for pregnant women was increased by the promotion of family involvement throughout their informational and instructive activities. The *Aiiku Han* practice fostered an environment that allowed pregnant mothers to perform health-seeking and health-promoting behaviors (Minamishima). Ultimately, health services in Japan have facilitated the

present infant mortality rate through health education for primary health care and grassroots community participation and Japan has become a model for other Asian countries, who still suffer from persistently high infant mortality rates. The Japan International Cooperation of Welfare Services, the Imperial Gift Foundation, and the *Boshi Aiiku Kai* (the Aiiku Association for Maternal and Child Health and Welfare) have extended international aid and programming for specific maternal and child health projects and ventures.

The majority of health education and health promotion programs focus on and prioritize nutrition, healthy lifestyles, and health literacy. Women are at the helm in Japanese culture to ensure a healthy lifestyle for their family and after participating in the *Aiiku Han* community-based intervention, women became even more active in promoting and advocating their own health and that of their children (Minamishima). They also began dispelling crucial information to other members of their community, such that they become community leaders, which are a crucial factor in the success of health interventions.

Sexual Health Behavior

In 2013, census data reported to UNICEF found an estimated 54.3% of the Japanese population used a method of contraceptive in their last sexual encounter. 99.8% of births occurred within an institutional setting: either a public hospital or private clinic and 100% of babies born in 2013 were registered with the appropriate government department at the local municipality office.

Maternal Nutrition

Obstetric doctors in Japan may advise against taking vitamin supplements, and instead suggest that a healthy maternal diet of fruits, vegetables, and milk will provide all the necessary nutrients, without the advent of unnecessary artificial materials, although synthetic vitamins are still available (Japan Info). Medical professionals also consider raw fish in sushi to be nutritious during the pregnancy; this may be a result of the ubiquity of seafood in traditional Japanese diets. Weight gain is closely monitored and the prevailing medical viewpoint is that women shouldn't gain between seven and twelve kilograms during their pregnancy, as it makes delivery and returning to their pre-pregnancy weight easier.

Traditional Sleeping Practices

Japanese sleeping arrangements and traditional sleep environment practices reflect the interdependent and collectivist values that are critical to the Japanese culture and population. Japanese children traditionally sleep with their parents in close proximity: 90% of three to four month-old infants sleep with their mother

in the same room, while 10% of infants below a year of age and 26% of older siblings (average age of three years) would sleep in their parents bed with the mother or father (Shimizu et al., 2). Therefore, most infants were in the same room as their parents at night, but they could be placed on a separate Japanese sleeping mat, rather than in the parents' bed, unlike a minority of infants and older children. Co-sleeping, the predominant sleeping practice, or proximal sleeping positioning have been maintained in Japan, even as society has transformed into a contemporary one. Studies of Japanese cultural beliefs and ethnotheories of infant development correlate to a high rate of co-sleeping. "The ideal is for the...mother to create a relationship in which the infant is naturally drawn into considerate, interdependent, competent interactions with others. The first step is to satisfy the infant's desires for proximity, to accept and respond directly to the infant's proclivities and affectional needs" (Shimizu et al., 2). Co-sleeping reflects early socialization into interpersonal connectedness and these practices are seen as a sign of intimacy and mutual interdependence. This is in stark contrast to recommendations by American pediatricians and experts, who suggest that the child sleeps alone, on their back, and in a crib. In 1994, the infant mortality rate attributed to sudden infant death syndrome was 0.256 per 1,000 live births; increased risk has been attributed to low birth weight, lower maternal age, illegitimacy, late birth order, male gender, and maternal smoking (Fujita and Kato, 326).

Single Motherhood

According to an article in *The New York Times*, only 1.1% of births in Japan in 1994 were to unwed women, while 30.1% of births in the United States in 1994 were to unwed women. There was almost a 90% reduction in the single-mother birth rate in Japan in the post-World War II period (Wudunn). Japanese teenagers are less sexually active than adolescents in other countries, though the predominant belief is that they are very sexually active by national standards and perspectives. Abortions are more easily accessible, accepted, and common than in other countries. The most important factor behind these trends is the social stigma, humiliation, and discrimination of having a baby without the preceding wedding. Children born out of wedlock often face slimmer marriage prospects, have weaker inheritance rights, and their unusual family status is recorded in their required family registration. There have even been stories of older children being told by teachers and professors that even if they do well on national university qualifying examinations, they won't be accepted into prominent schools. Tax policies also discriminate against single mothers, as they don't receive the same tax deduction as widowed or divorced mothers. Unwed mothers in Japan have indicated that they prefer to find work and corresponding daycare options for their child needs, rather than go on welfare; less than 7% of single-parent households receive welfare benefits (Wudunn).

Shuhei Ninomiya, a law professor at the Ritsumeikan University in Kyoto has said that “it seems the national government thinks that if you allow single motherhood to proliferate, it would damage Japan. Japan accomplished high economic growth through this very established system of families, in which people took care of their parents. The national government feels that if single motherhood proliferates, Japan’s family system would break down and family morals would collapse.” Though this may be a severe interpretation, there is some applicability to the rigidity and universality of political conditions and public reactions to single-mother households and their children.

Shinto Practices and Influence

Shintoism is the native belief system of Japan that focuses on this physical life, in place of that of a supernatural or afterlife. Shinto rituals are viewed as more community-based, not as religion-based as Christian or Buddhist traditional practices; all members of the community attend these rituals, regardless of their individual religious identity (Saunders). When a child is born into the community, their name is inscribed in a Shinto shrine that is viewed as the nexus between the physical and spiritual world. This process and tradition doesn’t require permission of the child’s family. If oversight is made and the name of the child isn’t engraved in the shrine, the theological framework dictates that the child will become a “water child,” or a bringer of misfortune, even though this is not the fault of the child or their family, but of the community.

XVI. TOKYO ORGANIZATIONAL FACTORS

Healthcare System

After World War II, Japan had limited medical facilities and rural health centers were forced to provide both outpatient and inpatient services on a small scale and without the necessary infrastructure, personnel, or resources. Due to overuse and a finite system design, many regions of Japan are now facing severely inadequate healthcare resources and physicians; the healthcare system is financed and based largely on health insurance as all facilities participate in insurance coverage programs. The Japanese healthcare system is considered to be low-cost and cost-effective, as expenditures are below the OECD average and below what the United States spends per capita (Suzuki et al., 92). Despite this, Japan scores well on the majority of public health metrics and indicators. The government regulates nearly all aspects of the system and local and national governments are required to ensure an efficient and quality medical system. The national government sets healthcare fee schedules and give subsidies to local players or providers and enforces regulations for insurers and providers. The 47 prefectures implement those regulations and develop regional care delivery with their specific funds allocated by the national government (Matsuda).

Primary care is offered at most private clinics and hospital outpatient departments. Some clinics and hospital outpatient departments also offer outpatient specialist care. A third of physicians are salaried; nearly all others are self-employed. Private clinics are often owned by physicians or corporations. In 2014, the average clinic had “6.8 full time-equivalent workers, including 1.3 physicians, 2.0 nurses, and 1.8 clerks” (Matsuda). After-hours care is provided in some hospital outpatient departments and government-owned public clinics with on-call physicians. There is no strict requirement for clinics to provide these services and the national government often subsidizes local governments for running these clinics. The perinatal care system consists of secondary and tertiary perinatal emergency care systems in each of the forty-seven prefectures for pregnancies and deliveries, community-level care, and high-level medical care. Family care leave benefits are paid for up to three months. The government also maintains a national pediatric medical advice telephone line that is available after-hours.

15% of hospitals and 20% of hospital beds are owned by national or local government agencies, while the rest are run by private or non-profit organizations (Matsuda). Consultation fees for these larger government hospitals or medical centers tend to be lower than for privately-owned hospitals and clinics. More than half of all acute care hospital beds are paid for using the Diagnosis Procedure Combination system and the rest are paid for on a fee-for-service basis. Mental health care is relatively destigmatized and accessible; it is provided in both in- and out-patient and home care settings with a 30% coinsurance and a reduced cost-sharing that covers psychological tests and therapies, medications, and rehabilitation, with access to specialized mental health clinics and programs (Matsuda).

Healthcare economics experts believe that the sustainability of the Japanese healthcare system is in question, as the national accreditation scheme is weak and doctors receive their license for life, with no need for renewal or updating. The national health insurance program cost 6.6% of the GDP (equivalent to JP¥33.1 trillion) in 2005, but expenditures have already exceeded 2020 projections of 10% of the GDP (over JP¥62.3 trillion). Japan has the highest debt burden in the OECD, a rapidly aging population and by some projections, the oldest national population, and a stagnating economy. There is a lack of central control over the allocation of medical resources, which leads to three to four times more CT, MRI, and PET scanners per capita than all other developed countries, and most of these machines are underutilized (Henke et al.).

It has been suggested that the country’s health system unintentionally promotes overutilization. The Japanese populace see physicians almost fourteen times per year, which is three times the number of visits

observed in other OECD countries (Henke et al.). Japan has the highest number of doctor consultations per capita, which has been used to justify the limitation of labor rights of physicians, who have been unable to organize strikes or protest for higher wages or shorter hours. The introduction of copayments and increased rates have done little to reduce the number of consultations. The average hospital stay is two to three times as long in Japan as in other developed countries, even though demographics of patients, severity of their illnesses and conditions, and other medical factors do not fully explain the difference in length of stay.

Though it allows coverage of their services, the healthcare system traditionally does not feature a family or primary care physician, as insurance providers allow patients to see specialists directly, without the need for a referral, so specialists must spend time seeing minor cases that don't require their attention or diagnosis. This lack of an organized primary care system overwhelms the limited medical resources. Healthcare is viewed as sacred work in Japan and professionals are expected to make large personal sacrifices in personal and leisure time. "When a fully booked schedule causes a patient to be turned away, the Japanese public views this as impersonal and immoral because healthcare professionals are supposed to help people in need whenever asked" (Suzuki et al., 94). The average physician-to- resident ratio is estimated to be approximately 2.3 medical professionals for every 1,000 residents, which is among the lowest of all industrial countries and below the OECD average of three physicians per 1,000 residents. *The Western Journal of Emergency Medicine*, reports of a current and ongoing change in public attitude toward healthcare: "malpractice lawsuits are on the rise, health spending by the government is decreasing, and patient expectations have increased" (Suzuki et al., 93).

Health Insurance Scheme

The Statutory Health Insurance System (SHIS) is the publicly-financed health insurance that provides universal primary coverage. The majority of the population maintains some form of private insurance as a supplement or complement to their SHIS enrollment (Matsuda). The total healthcare expenditure in 2013 was 11% of the total GDP, 84.3% of which was publicly funded (Matsuda). Citizens and resident non-citizens are required to enroll in a SHIS plan, based on their age, employment, and residence; those who fail to maintain their enrollment must pay up to two years' worth of premium fees when re-enrolling. All SHIS plans provide the same benefits, determined by the national government and verified by the Central Social Insurance Medical Council. They cover preventative, hospital, primary, specialty, dental, hospice, and mental health care, prescription medications, and home care services. All adult enrollees pay a 30% coinsurance, while child and elderly enrollees pay a coinsurance between 10-20%, with no

deductibles for any age group (Matsuda). Copayments for pediatric care is subsidized by local governments and catastrophic care coverage specifies a monthly out-of-pocket threshold which varies by age and income. Primary care payments are based on the national fee-for-services schedule, which includes financial incentives for coordinating chronic disease care and management and for ambulatory or home care. 50% of long-term care financing comes through taxation and 50% comes through premiums. A 20% coinsurance rate applies to all services up to a specific income-related ceiling (Matsuda).

Gaps in Access and Care

Public education is still insufficient in conveying basic common knowledge about the social security system and public support as information-disadvantaged people are isolated from society and cannot receive public services (Unno, 234). As a result, Japan must establish administrative solutions to reach especially socioeconomically vulnerable women. Japan has an excellent prenatal checkup system that begins when a woman is issued her Maternal and Child Health Handbook after reporting her pregnancy to the corresponding local municipal office. Around 0.3% of pregnant women do not undergo regular prenatal checkups, due mainly to financial issues, leading to pregnancy complications, such as preterm birth, low birth weight, and infant death (Unno, 235). Many of these women are uninsured or on welfare and about 40% of them are not required to pay the delivery expenses, as they are covered by the government subsidies and insurance plans.

Very limited regions in Japan provide obstetric primary emergency medical care at night or on holidays and some prenatal care facilities cannot be contacted outside of normal business hours, so in emergency situations, women with regular prenatal checkups and coverage are often left in the same position as those lacking access to regular visits (Unno, 235). Pregnant women without prenatal checkups are a medically high-risk group and they are limited to seeking care by large hospital systems and their perinatal centers. Nobuya Unno, an obstetrics and gynecology professor at Kitasato University School of Medicine, has suggested that the expansion of prenatal checkup subsidies as a potential means of addressing the problem of a lack of a primary care prenatal emergency system can be an effective measure for those who limit or avoid prenatal checkups due to financial constraints and alleviate the burden placed on ambulatory teams. Health disparities between regions are reported by the government and health disparities between socioeconomic classes and healthcare access are occasionally measured by researchers and “reducing health disparities between population groups has been a goal of the national health promotion strategy since 2012” (Matsuda). These goals cover the reduction of disparities in healthy life expectancies

between prefectures and the increase in the number of local governments working to reduce health disparities.

Cultural Birthing Trends

Many women have an extremely fundamental and cultural desire to give birth in their community that stems from the traditional Japanese childbirth style (Unno, 236). The number of birthing facilities at major hospitals and clinics is decreasing, which is an unavoidable situation brought about by the decrease in actual number of births and the need for improved safety during delivery. Midwives may enhance the satisfaction of pregnant women and can be beneficial in the formation of the mother-child bond, so there is an imminent need to address the nationwide shortage (currently there are 8,000 fewer midwives working than the necessary level) (Unno, 236). Approximately half of all births are performed at clinics with beds, which causes questions about the sustainability of a delivery system that is dependent on clinics with beds. “[The] current perinatal care system is based on the concept of ensuring that patients are smoothly referred and transported to advanced medical facilities when necessary through the construction of a close network between small-scale birthing facilities in local communities and regional base hospitals [and] perinatal centers” (Unno, 236). There is a need to increase the number of neonatal intensive care units and general care unit beds for children past the acute phase of their conditions and needs.

Post-Birth Trends

The Japanese people have been said to be very risk-averse, especially when it comes to their health. Japanese women and children who experience no complications during birth will traditionally stay in the hospital for five days if they had a natural birth and seven days if they have undergone a cesarean section. Epidurals are extremely uncommon during birth and some medical facilities will even refuse to administer the procedure, due to the cultural belief that a natural labor can catalyze the bonding between mother and child. During their post-birth stay in the hospital, women receive information about how to care for their newborn and are allowed to heal in a supportive, capable environment. Only the mothers and infant are allowed to stay overnight in the hospital; other family members are permitted to visit during the day. Even after they have returned home, the mother and infant are often visited by public health nurses deployed by the hospital or clinic to check up on them and answer any questions.

Tokyo Super Comprehensive Perinatal Center and Mandatory Notification of Birth

The Tokyo Metropolitan Government maintains what is known as a “super comprehensive perinatal center.” Nationally, perinatal medicine and emergency medicine are regarded as unprofitable, policy-based medicine, and there was, and continues to be, a lack of incentives for hospitals to proactively allocate resources to this division. In 2010, the budget drastically increased funding for perinatal care (Unno, 240).

Expecting mothers are eligible for various social support services given by prefectural government if the pregnancy is reported to the local municipality office. Upon reporting it, the mother will receive a maternal and child health handbook and information regarding prenatal checkups, classes, and a birth notification form. The mandatory notification of birth must be submitted to the local municipal office within fourteen days of the birth. The form must include a birth certificate signed by a doctor and a form stating whether or not the parents are married; this form will be the first place where the baby’s name will be officially documented and recorded (Tokyo International Communication Committee). It is recommended that parents should also notify the local public health office to receive information about a home visit consultation, infant and toddler health checkups, and required vaccinations, for example. A portion of the fees for these checkups will be covered by the local prefectural government, though the amount of public support depends on the ward, is based on means-tested childbirth expense support; additional prenatal health guidance is provided to pregnant women with financial constraints. If any abnormality or condition is discovered in these checkups, further examinations at designated clinics or secondary and tertiary health institutes will be available free of charge (Tokyo International Communication Committee).

XVII. TOKYO COMMUNITY FACTORS

Japanese Demographic Transition

Before their industrialization, Japan’s population was marked by high rates of mortality, due primarily to intermittent and widespread famines and disease. They had a “relatively high degree of urbanization, small families, deliberate population control through social practices and birth control, relatively low birth rates for a pre-modern population, low rates of adult mortality, and a life expectancy for adults” greater or equal to that of the United States (Hanley, 127). The transition from traditional to modern society involved eight characteristics that are relatively universal across most industrializing countries -- a demographic revolution and the related adjustments in family size and structure, a broadening of the stratification system, the rise of bureaucracy, a declining influence of religion, changes in education, an

expansion of mass culture, and an emergence of a market economy. As observed in the interpersonal and organizational chapters, the study of the family institution is particularly critical to understand the Japanese transition, as family is one of the most critical societal institutions.

Religion

There has always been a polytheistic cultural orientation in Japanese society, especially between four schools of thought -- Shintoism, Buddhism, Confucianism, and Christianity and through their accompanying ways of thinking, the Japanese people can frame their own thinking and existences (Kumagai, 137-138). *Shinto* means “the way of God,” as the only indigenous religion of the country that focused on the animistic worship of natural phenomena and preserves rituals to celebrate life events, like weddings, baptisms, the well-being of children, and construction of houses. It through this spiritual framework that children’s names are engraved in a community shrine and the lack thereof that they may become water children. Buddhism is concerned with life after death and the salvation of the individual with rituals to celebrate afterlife events, like funerals, ancestor worship, the autumnal equinox, and the summer *obon* festival (the festival of souls). Confucianism contributed to the growth of secularism in Japanese society as the nation was industrializing as the faith is more of an ideology than a formal religion. Confucianism created the moral code for all Japanese, emphasizing personal virtue, justice, and family devotion with two key teachings -- *chu*, or the subordination to the emperor or superior, and *ko*, or filial piety. Christianity, as a Western doctrine, contributed to the modernization of Japan and served as the strongest influence among the Japanese in its ethical and doctrinated values.

Maternal and Child Health Handbook

As mentioned previously in this thesis, the maternal and child handbook is defined by the 10th International Conference on MCH Handbook as “a book that contains essential information, kept by the family, to promote and maintain the health of mothers and children.” The handbook itself is not a tool that can directly reduce maternal and child mortality, but it can increase knowledge, promote attitudes, and change maternal and child health-related behaviors (Nakamura). Goals of the conversations in the international conferences and the evolution of the handbook include the need “to leave nobody behind to ensure the continuum of maternal, newborn, and child healthcare, promoting a harmonized mélange of care within many health fields, to offer a flexible tool that can be adapted to each country’s needs and culture, to empower women, and to apply ICT [Information and Communication Technology] to MCH Handbook” (Nakamura).

The booklet contains health records, of the mother and child and serves as an instructional guide to pregnancy, delivery, and child-rearing through the tracking of essential health information. It also allows obstetricians, pediatricians, public health nurses, and midwives to document and include basic medical records. The *Boshi kenko techo* is issued by the local Japanese public offices because every expecting woman is required to report her pregnancy to local offices and is recommended to enter all information concerning the pregnancy, childbirth, and child health in the mother-child handbook, until the child enters preschool. The handbook maps mandatory check-ups at three, six, twelve, eighteen, and 36 months of age and checkup dates are mailed to the family by public health centers; attendance is strongly encouraged and if the mother misses the appointment, a nurse may conduct follow-up visits with the mother at the home. The handbook intervention was originally established to increase infant survival rates, but its role has expanded to covering maternal health and well-being as infant mortality rate in Japan is one of the lowest in the world (Kazui, 494). The use of the handbook correlates to the third Sustainable Development Goal to “ensure healthy lives and promote well-being for all at all ages.” It has been proposed by researchers to publish a *Fushi kenko techo*, or a Father-Child Handbook, aimed at redefining public perception of child-rearing in this exceedingly patriarchal society by increasing paternal responsibility and presence in the childhood.

The handbook was first published in Japan in 1948 and linked to its publication, the neonatal and infant mortality rates began to decrease severely to the current neonatal level of 0.9 deaths per 1,000 live births and the current overall infant mortality rate of two deaths per 1,000 live births (Nakamura). Not only does the handbook allow for the consolidation of medical information and parental experiences throughout the process, but “when parents keep their handbooks, they can communicate their concerns to health professionals. The Handbook empowers parents” (Azrur Anwar, 10th International Conference on MCH Handbook). Since 1991, each municipality is responsible for updating and distributing the handbook, such that individual cities are therefore allowed to add pertinent and specific information. These handbooks are often the only healthcare guides available at the family home and nearly 100% of families have, utilize, and keep them until the child is married.

The handbook is currently available in Tokyo in ten languages: Japanese, English, Korean, Chinese, Vietnamese, Thai, Tagalog, Portuguese, Indonesian, and Spanish. As of 2016, in addition to Japan, Maternal and Child Health Handbooks are now consistently used in Benin, Bhutan, Burkina Faso, Côte d’Ivoire, Indonesia, Kenya, the Netherlands, Niger, the Palestine, the Philippines, Senegal, South Korea, Timor Leste, Thailand, Tunisia, and the state of Utah. Pilot programs, supported by international aid

organizations like the United Nations and other non-governmental organizations, are being introduced in Afghanistan, Angola, Bangladesh, Brazil, Burundi, Cambodia, Cameroon, China, Djibouti, Dominican Republic, Gabon, Ghana, Madagascar, Micronesia, Mongolia, Myanmar, Peru, Tajikistan, Uganda, and Vietnam; other programs in Brunei, Nigeria, and Turkey are in the planning stage.

The Maternity Mark

Expecting Japanese mothers can also elect for what is known as the maternity mark, or a “baby-in-me” badge, which is a keychain or badge received at the initial prenatal care checkup and is worn to indicate that the individual is pregnant (Japan Info). It is particularly useful in stressful public situations, like waiting on long lines or traveling on public transportation systems as it is a common belief that pregnant women have a right to priority seating, being able to cut ahead in line, and to other safety or facilitative measures in public.

Tokyo Child Guidance Office

The Tokyo child guidance office accepts any type of consultation for all matters relevant to the growth and development of any child under eighteen years of age, even though children aren’t considered full, contributing adults of society until they reach age twenty (Bureau of Social Welfare and Public Health). All counseling is offered free of charge. It is “a specialized counseling institution designed to search for solutions and to solve problems with the hope of supporting children’s sound growth” (Bureau of Social Welfare and Public Health). Staff members include a child welfare officer, a child psychotherapist, and a medical doctor who are in charge of counseling and medical services. The office is connected with the National Child Consultation Hotline, which deals with urgent issues related to child abuse suspicions and child safety matters; this hotline can offer advice and consults in Japanese, English, Chinese, and Korean.

XVIII. TOKYO POLICY FACTORS

Infant Mortality Trends

In 2010, Yasuhide Nakamura, a professor of international collaboration at Osaka University, proposed five possible explanations for Japan’s low infant mortality rate: the little disparity in national socioeconomic distribution, the national health insurance scheme, the maternal and child health handbook, population-based screening due to mandatory pregnancy reporting and hospital outreach efforts, and a high cultural value placed on childbearing. He writes that “maternal and child health is one of the most conservative fields because each ethnic group has preserved its traditions related to pregnancy, delivery, and child-rearing.” From 1947 to 2007, the crude birth rate dropped from 34.3 births

per 1,000 people to 8.6 births per 1,000 people (Nakamura, 259). The birth rate dropped 26% in 1966 due to *Hinoeuma*, or the Year of the Horse -- “many couples did not want babies because of the traditional belief that girls born in a *Hinoeuma* year will be dangerous, headstrong, and...bad luck for any husband” (Nakamura, 259). Even though many parents knew that there was no scientific evidence to support this principle, they still refrained from having children, especially since technology for prenatal sex discernment didn’t exist in 1966. The next *Hinoeuma* will be in 2026, as it happens every sixty years.

Eugenic Protection Act of 1948

The first specific maternal and child health-related law in Japan was published in 1948. The Eugenic Protection Act “aim[ed] to prevent the birth of inferior offspring as well as to protect maternal life and health” (Terao, 208). This act also created the Japan Association of Maternal Welfare, comprised of designated and elected physicians, and established an association in every prefecture. This law was later renamed the Maternal Protection Act as the only law that “entrusts the execution of administrative right (as in the appointment right of designated physicians) to prefectural medical associations” (Terao, 209).

Committee on the Rights of the Child

The Committee on the Rights of the Child was the governmental arm that established the three fundamental principles of the Children’s Charter of Japan: the child shall be respected as a human being; the child shall be esteemed as a member of society; and the child shall be raised in a good environment. These declarations established the core rights of children and the commitment to guarantee and promote their well-being through the recognition of their civil liberties -- the rights to liberty, freedom of expression, thought, and conscience, and religion -- and social rights -- the rights to receive education and maintain the minimum standards of wholesome and cultured living.

The Child Welfare Law of 1947

The Child Welfare Law, published in 1947, declared inherent rights of children and specific actions and responsibilities that community members and organizations have in order to protect these rights. Article 1 states that “all people shall strive to ensure the sound birth and growth of children, both in mind and body. The livelihood of each and every child shall equally be guaranteed and protected.” All members of society -- from parents and guardians to teachers -- share in this responsibility and each child must be respected as a human being to enjoy fundamental human rights. Article 2 asserts “the State and local public entities bear responsibility for the sound mental and physical growth of children”; the third article affirms “the principles stipulated in the preceding two articles guarantee the welfare of children and shall

be observed at all times in the enforcement of all laws and ordinances concerning children” (Ministry of Foreign Affairs of Japan, 1996).

Fundamental Law of Education, School Education Law of 1947

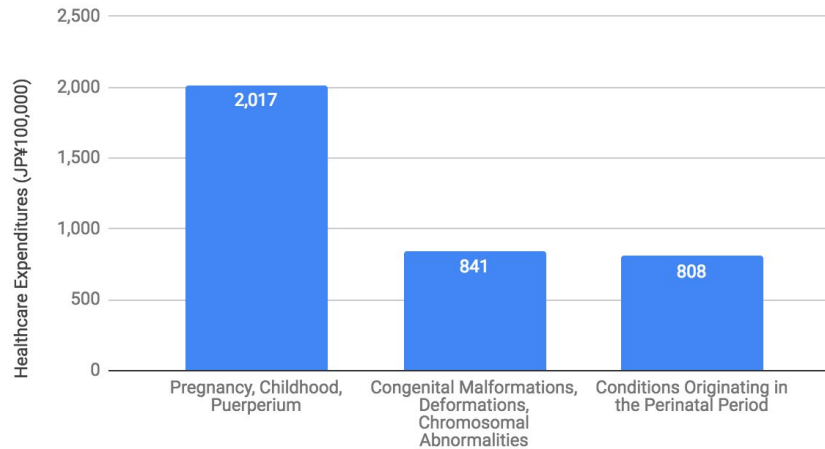
The Fundamental Law of Education and the School Education Law guaranteed the dissemination of education and achieved almost 100% school enrollment in compulsory education. In Japan, education extremely individually-oriented and is considered a personal dignity. The mandated five-day school week, with optional classes or extracurriculars on Saturdays, gives “latitude in children’s lifestyles and provide[s] children with opportunities to gain ample experience in various activities in everyday life at home as well as in the local community” (Ministry of Foreign Affairs of Japan). Child welfare facilities and centers work after school hours and on weekends to “engage children in sound play, promote their health, and cultivate their artistic aptitude” (Ministry of Foreign Affairs of Japan). These policies and practices also occupy adolescence, such that there is minimal time for sexual exploration and engagement in risky sexual behavior. From 2008 to 2011, Japan saw a 100% primary school enrollment, with 99.4% of males and 99.7% of females enrolling in secondary school (UNICEF).

Advocacy and Health Programs

There are a variety of outreach and advocacy mechanisms, through child guidance centers, nursing facilities, and daycare centers, that the government employs to connect with and guide women and families (Ministry of Foreign Affairs of Japan). Health guidance for and obligatory examinations of pregnant women, infants, and toddlers, nutrition improvement assistance, nursing and medical assistance of premature babies, and the issuing of the Maternal and Child Health Handbook are a few of the ways that health and well-being are reinforced in this life stage.

A nationwide program for a healthier population was augmented in 2006, with a particular focus on a disease management program as the epidemiological shift has altered the disease structure from more acute diseases to lifestyle-related chronic conditions; these chronic diagnoses are estimated to account for 66% of deaths and 33% of health expenditures. These expenses are expected to increase by approximately JP¥30 trillion from JP¥34 trillion to JP¥65 trillion from 2007 to 2025 (Matsuda, 11). In units of 100 million, total health expenditures in 2003 were estimated at JP¥493,327, while pregnancy, childbirth, and puerperium costs were only JP¥2,017. JP¥808 was spent on certain conditions originating in the perinatal period, while JP¥841 were spent on congenital malformations, deformations, and chromosomal abnormalities (Matsuda, 12).

Maternal and Child Health-Related Expenditures



Estimated Japanese health expenditures in 2003 (Matsuda).

Maternal and child health-related causes make up a vast minority of expenses, but this could be due to the fact that there is not a pressing need to increase such expenditures, especially when one considers that the greatly increasing proportion of elderly individuals, with the health conditions that follow such an age distribution, poses a much larger challenge to Japan's healthcare and social support systems.

XIX. CONCLUSION AND FINAL RECOMMENDATIONS

Infant mortality is both the summation and a reflection of the equality, equity, and socioeconomic status -- among other factors -- of a society and is analogous to all other health and access indicators in said society, irrespective of how they directly relate to maternal and child health. Infant mortality "reflects the quality of obstetric and neonatal care, the health and welfare of women before conception and during pregnancy, and the health of children after birth...[it] is also strongly associated with public policies that impact on levels of poverty, income and employment support for parents" (Zylbersztejn et al., 1). By using the social ecological model, one can examine both the proximate and distal causal factors behind infant mortality with further analysis able to reveal faults and areas for improvement on each, or multiple, societal levels -- individual, interpersonal, organizational, community, and policy.

Japan and the United States are both high-income nations in the Organization for Economic Cooperation and Development; they are both on the frontlines of medical and technological experimentation and advancement, but this lens must be adapted to observe the intercultural and between-nation differences to fully understand and navigate the infant mortality dichotomy that persists between the United States and Japan. For this angle, international comparisons are useful and productive tools to unravel the differing

manifestations of this rate and, subsequently, the public health sector in both countries. Globalization has facilitated a marketplace to explore our more interconnected world and ideas not only for heterogeneous social systems, but for methodologies to reduce infant mortality. International comparative research can, specifically for infant mortality reduction, determine the extent it occurs internationally and can identify how other nations are responding and addressing the problem, while developing an understanding of how specific in-country features and distributions are affecting each intervention or response and this particular health outcome overall. “Understanding the impact individual policies [and programs] have in different contexts would allow future policies to be set in context and be identified as determinant” (McPake and Mills, 812). Thus, international comparisons are used by multilateral and multinational organizations like the Organization for Economic Cooperation and Development or the World Health Organization, but in-nation policymakers can also use this dichotomous research in efforts to reduce their infant mortality rates to levels observed elsewhere in countries with the lowest rates. Tokyo is an excellent example of an international city that is similar in socioeconomic standing and other demographic characteristics and can serve as a prototype for the creation and improvement of maternal and child health interventions in Franklin County to better ameliorate health outcomes and the health and productivity of individuals, families, and communities across the county.

Individual Level

Individual level barriers can exist at the infant or maternal level. Franklin County saw the largest number of infant deaths in 2009 attributed to sudden infant death syndrome, which occurred with a higher incidence among low-income and single mothers and in subsequent pregnancies. Prematurity is the leading cause of infant mortality in Franklin County, behind one in nine births and causing approximately 35% of deaths before the first year of age. Between 2009 and 2014, the crude prematurity birth proportion in Tokyo, defined as birth before 34 weeks, was 1.06%, and this rate has been significantly linked to maternal age, with both adolescent and older mothers experiencing a higher rate of prematurity and low birth weight. In Franklin County, low birth weight occurred in 8.6% of all births in 2011, but in 13.6% of non-Hispanic black births and only 7.3% of non-Hispanic white births and 7.4% of Hispanic births. Tokyo is experiencing an increase in low birth weight, from 4.7% of male births and 5.5% of female births in 1975 to 8.1% of male births and 10.1% of female births in 2003; this increase has been linked to the increasing rate of maternal smoking. Maternal age is a distal factor to infant mortality in both Franklin County and Tokyo, as extremely low or extremely high maternal age is linked with a higher incidence of SIDS in Franklin County, in addition to low birth weight and prematurity seen in both cities. While Japan has the lowest teenage birth rate in the industrialized world, Franklin County had a teen birth

rate higher than the national average (10.1 per 1,000 females), at 12.8 per 1,000 females between 2013 and 2015. Maternal stress is an auxiliary component identified particularly in minority women in Franklin County that can lead to preterm delivery or other chronic health problems. While maternal smoking has been linked in both Japan and the United States as leading to infant mortality, this pattern exists only to an extent in Franklin County, as the children of black women who didn't smoke generally had worse health outcomes than the children of white women who did smoke. In Tokyo, however, maternal smoking and fetal exposure to tobacco is one of the most significant variables correlated with low birth weight, prematurity, and poor fetal growth.

Interpersonal Level

While single motherhood, indicated by a lack of paternal data on birth certificates, is a significant problem in Franklin County, as infants born to single women often have worse health outcomes, only 1.1% of births in Japan in 1994 were to a single mother, compared to 30.1% of births in the United States in the same year. This extreme dichotomy is attributed to societal, cultural, and economic behaviors or policies in Tokyo. Internalized racism is a causal factor behind infant mortality, especially for black women in Columbus, as those that had worse pregnancy outcomes also experienced higher levels of racism than their black counterparts with better pregnancy outcomes. Racism has not yet been linked to poor health outcomes in Japan, however, mothers still experience high levels of stress due to concerns about the child's welfare, as child-rearing is traditionally women's work. Religiosity, in both the level and type of it, is a distal factor to infant mortality; in Japan, the faith system, Shintoism, is believed to have a spiritual influence on the future of the child, while counties across the United States with a greater share of Catholic churches, compared to other denominations, have a lower infant mortality rate, while those with a greater share of Protestant, particularly Pentecostal, churches have a higher infant mortality rate. American pediatricians recommend putting the infant to sleep on their back and alone in a crib; however, only about 53.2% of black mothers and 76.4% of non-Hispanic white mothers put their child to sleep in this manner. This recommendation is an exact inverse to the predominant co-sleeping practice in Japan, in that 90% of three to four month old infants sleep in the same room as their mother, and 10% of infants and 26% of older children sleep in the same bed. Japan has attributed much of its low infant mortality rate and other positive pregnancy-related health outcomes to the work of community health workers, the *Aiiku Han Ins*, as community participation is thought to be key in a child's development. These volunteers spread health information and liaise between the government and individual women and their work has been shown to not only improve health outcomes, but to empower women to perform more health-seeking and health-promoting behaviors.

Organizational Level

Both the United States and Japan are leaders in the medical innovation fields; their status as high-income nations also means that their citizens have access to higher-quality or more advanced care, but when it relates to pregnancy-related medical intervention in Franklin County, 17% of mothers reported not seeking out or benefitting from prenatal care in the first trimester, even though prenatal care is linked to a lower risk of SIDS, and by extension, infant mortality. Conversely to Franklin County, only 0.3% of Japanese women did not undergo regular prenatal care checkups, due mainly to financial complications; an increased prevalence of preterm birth, low birth weight, and infant mortality was observed in this population. The Japanese healthcare system is universal and its spending is considered to be low-cost and cost-effective; despite spending less on healthcare than the OECD average, Japan scored high on many public health metrics. However, in emergency situations, because Tokyo does not maintain after-hours hotlines and emergency obstetric care is limited, women with coverage and women lacking it face the same obstacles. Women in Japan are delaying childbirth in favor of educational pursuit and career advancement, so there is concern over the rising average maternal age. In Franklin County and across the United States, education can serve as a protective factor against infant mortality, as women with higher levels of education report lower levels of infant mortality. Education, however, also increases the disparity between white and black women in Ohio, because an infant born to a black women with five years of higher education still faces an increased risk of dying before their first birthday than infants born to white women with a high school education or less. At the same time, being in a lower income class in Franklin County increased one's odds of infant mortality, prematurity, low birth weight, and very low birth weight by posing risk through various correlates of poverty. However, due to various social support systems, universal healthcare, and the maternal and child health handbook, being in a lower income class or in poverty did not have nearly the same effect in Tokyo as it has in Franklin County. Nevertheless, there are still hard-to-reach and socioeconomically vulnerable populations and women in Japan that need administrative interventions and institutions to increase their access to public services.

Community Level

Franklin County, like the rest of the United States, historically employed discriminatory race-based policies that facilitated the fact that residential segregation, after controlling for poverty rates, median family incomes, and the proportion of single female heads-of-household, is the best predictor of infant mortality rates. In Tokyo, prior to their industrialization period after World War II, they transitioned from a relatively poor nation with high rates of disease, famine, and mortality to one that had a high degree of urbanization, deliberate population control methods that resulted in small families and low birth rates, and

low rates of adult mortality. In Franklin County, this manifested in increased rates of chronic stress, racism, and other negative characteristics of the community that can have an impact on their reproductive health. There are various programs and institutions in place in Tokyo communities to aid in the health and well-being of pregnant mothers, that stem from the community-based and participatory view of childhood and health, for example, the maternity mark to indicate one's pregnancy that grants one the ability to enjoy special privileges in public. Regardless of where one is born and lives in the world, whether it is Japan or the United States, the infant is extremely vulnerable and susceptible to negative influences in the family and environment. In the United States, there was a 7% to 11% greater black infant mortality rate in ZIP codes and regions with higher rates of homicide, greater levels of residential segregation and isolation, those that were food deserts, and those that experienced greater levels of air pollution. There has not been many data or studies relating to these trends in Japan, though they utilize various community-based practices to assist in the health development of the child: mandated hospital stays for five to seven days depending on birth method, health education and promotion programs that prioritize nutrition, lifestyles, and literacy, the *Aiiku Han* volunteer-based intervention, and the Tokyo child guidance office. Columbus has also introduced various comprehensive research-based and programs to examine the disparities and high rates of infant mortality in and around the region to implement and evaluate interventions and their impact. The development and introduction of a maternal and child handbook, previously launched in Utah, would be a great venture for the improvement of maternal and child health overall, while also tackling the high infant mortality rate in Columbus.

Policy Level

While there has been multiple laws and measures related to maternal and child health enacted in both Tokyo and Franklin County, one could argue that the policies are much more community-based in Tokyo than in Ohio, beginning in 1948 with the Eugenic Protection Act and the resulting Japan Association of Maternal Welfare. Conversely, in Franklin County, previous efforts to reduce infant mortality prioritized proximate and underlying causes, like medical and prenatal care and specific case management, that have been said to be too little, too late to improve maternal and child health overall, since many of the outcomes are the result of distal factors that cannot be fixed or ameliorated by focusing solely on these downstream elements. The emphasis throughout Tokyo's, and Japan's, policies is more extensive and comprehensive, in that their applicability to maternal and child health is not limited to this public health sector, but that the recognition of the importance of helping children extends through all laws, regardless of how directly they relate to infant mortality and other metrics. In Columbus, and other neighborhoods in the United States, African-Americans are disproportionately overrepresented in low-income

neighborhoods and become victims to their location, by experiencing negative risk factors more often due to their neighborhood; laws and attempts to ameliorate this trend in the United States have not met much success and there is still no broad or outright policy or legislation like the Japanese Committee on the Rights of the Child. Franklin County has introduced the Greater Columbus Infant Mortality Task Force and create the Senate Bill 322 legislation to take various approaches towards reducing infant mortality in central Ohio; these comprehensive techniques will more likely prove successful, as any public health intervention must integrate different programs and responses to increase the efficiency and effectiveness, rather than siloing each topic as its separate implementation. However, Franklin County could create more outreach and advocacy programs for disadvantaged and underrepresented populations by tracking and elaborating on the hotspot process created by Jason Reece and David Norris, due to the fact that the worst pregnancy-related health outcomes and infant mortality rates are often seen in these regions. Tokyo has created stable advocacy programs through child guidance centers, nursing facilities, and daycare centers that the government can utilize to connect with women, especially those at an increased risk for poor health outcomes and various mechanisms, like the maternal and child health handbook and obligatory health examinations, help to reinforce the wellbeing of mothers and children, while also reinforcing the positive role the government and public health institutions play in the development of children and mothers in the reproductive life stage.

Recommendations

Based on this analysis and thorough research of the existing literature, programmatic data, and infrastructure in both Franklin County, Ohio and Tokyo, Japan, I have concluded five potential resolutions and interventions for Columbus, including universal introduction and use of a maternal and child health handbook, consolidation of the information provided by medical professionals, expanded, uniform, and scientifically accurate sexual education in middle and high schools and increasing enrollment in after-school and extracurricular activities for students, addressing factors within the youth population to avoid a negative life course that precedes adolescent pregnancy and poor pregnancy outcomes, and the introduction of community health workers in the poorest and most disadvantaged ZIP codes. I have also devised two suggested implementations for Tokyo: the introduction of geographic and spatial analysis and more consistent analysis along socioeconomic lines and the condensation of important healthcare and social support information for rural and hard-to-reach pregnant populations, while expanding the emergency obstetric care systems.

Columbus Recommendations

I. Universal introduction and use of a maternal and child health handbook

As seen in Utah and 38 countries in Asia and Europe in various stages of the implementation process, the maternal and child health handbook and equivalent programs have been remarkably useful and successful, even when introduced vertically and independently; in Japan, the handbook was introduced along with other reforms and contexts and as such, it is impossible to fully disentangle and conceptualize the full and sole implications that the handbook has had, independent of other factors, on infant mortality reduction. In Utah, “the ‘Baby Your Baby’ program did not change or add any other resources or maternal health systems, [and] the decrease in the IMR may be attributable to the increased availability of educational materials and record keeping generated by the program” (Takeuchi et al., 7). Immediately following the handbook’s Utahn introduction, the state saw its greatest single-year decline in infant mortality. The thorough, consistent, and complete use of the handbook, in Japan and Utah, has been shown to assist in the tracking of health outcomes, health behaviors, and risk factors for families and medical professionals. Parental consciousness and intimate relationship with their infant can help identify and monitor early signs or disease, thus facilitating the appropriate medical care. “Collecting all of a child’s health records in one place makes it easier for parents and health professionals to provide appropriate and efficient care” (Takeuchi et al., 7). As observed in Japan, the handbook enables parents to feel qualified and capable to communicate their needs to doctors and other medical professionals, while feeling empowered about their parenting, while increasing knowledge and promoting health attitudes and behaviors. There is often a disconnect between socioeconomically disadvantaged parents and the medical institution, which can be bridged by use of this handbook -- because it is very straightforward and subjective through the tracking of maternal thoughts and feelings throughout the pregnancy and early childhood and includes reminders about healthy and appropriate development and when to seek medical care, parents can feel qualified and play a direct role in their child’s health, while having and maintaining a crucial resource to start conversations or engagement with the medical institution.

Columbus should follow in the steps of Utah and introduce a maternal and child health handbook for all mothers and families. This will be particularly useful for mothers and infants in disadvantaged communities, like those that fall in the ZIP codes of 43206 and 43207 and the neighborhoods identified by Jason Reece and David Norris. By empowering these parents and giving them some control and agency over their health and the health of their child, they will be more engaged with the medical institution and the development of their infant. Because these neighborhoods are disadvantaged and underrepresented, they lack the resources that wealthier and more advantaged neighborhoods have, this

intervention will be able to ameliorate part of this disparity and assist medical professionals in recognizing at-risk families and target specific populations for further advice and check-ups.

II. Consolidation of the information provided by medical professionals

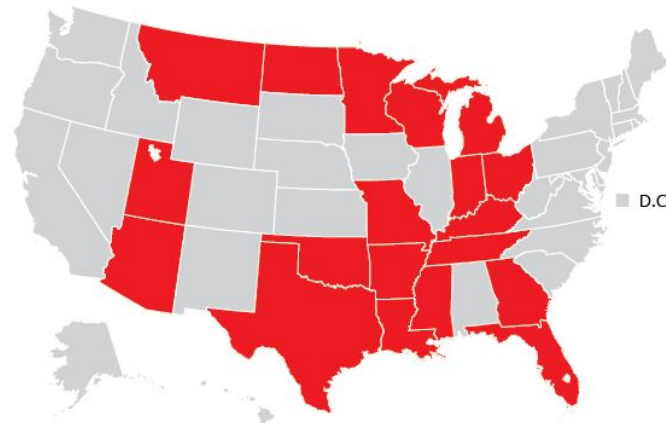
The consolidation of health information was a primary concern and complaint by Franklin County community members when asked by the Greater Columbus Infant Mortality Task Force. To clarify, consolidated information does not equate to universal information, as each woman with her distinct demographic characteristics and needs will require specific information and assistance. Part of the response to this gap in resources will be ameliorated with a comprehensive maternal and child health handbook; when it is made specifically for the Columbus region and its various populations, as in Japan it is monitored and updated by the local municipality office, stakeholders can be confident that the exhaustive material is both *au courant* and meticulous. Because part of this issue stems from isolated programs, doctors, and facilities that are, therefore, unaware of other advice in the community and may deliver contradictory or repetitive information. The Greater Columbus Infant Mortality Task Force suggests creating a central monitoring system to surveil programs and the respective participants and a centralized referral system to assist health workers in identifying the programming best matched for a particular family's needs. Because the task force was set up in an effort to create a community where health is not controlled or influenced by ZIP code, tracking and consolidating health information for each population in Columbus, particularly those found in underserved areas with the highest infant mortality rates can highlight needs and gaps and the progress made by various interventions. Improving access to prenatal care through awareness campaigns about Medicaid eligibility and telephone hotline systems with reduced wait times can augment the proportion of pregnant women accessing and participating in prenatal care services sufficiently. At the same time, many pregnant adolescents and mothers do not receive the support they require, and hotlines can serve as an outlet and counseling service; Tokyo and Japan maintain national hotlines that answer any questions or concerns and can direct or facilitate an individual's enrollment in additional care, while also identifying underserved and at-risk individuals.

III. Expanded, uniform, and scientifically accurate sexual education in middle and high schools and increasing enrollment in after-school and extracurricular activities for students

Though it is tinged, perhaps more significantly, with political and economic constraints, expanding and unifying scientifically-accurate sexual education programs in middle and high schools throughout the state of Ohio will increase youth health literacy and understanding of various issues and components of healthy relationships and sexual behavior. As of 2015, as depicted in this map published by the

Huffington Post, Ohio is one of nineteen states that is only required to mention abstinence, and not touch upon contraception, in discussions and educational courses about sexual health.

**States Where Sex Education, If Provided,
Must Include Information On Abstinence,
But Not On Contraception**



Note: Utah prohibits teachers from responding to students' spontaneous questions in ways that conflict with the law's requirements. In Mississippi, localities may include topics such as contraception or STIs only with permission from the State Department of Education.

Sources: Guttmacher (as of January 1, 2015)

THE HUFFINGTON POST

In red, states that are only required to mention abstinence with information that may not even be scientifically accurate. Contraception methods have been linked to lower incidence of sexually transmitted infections and greatly lowers the youth pregnancy rate, which will reduce the infant mortality rate, while also increasing comprehensive sexual health knowledge.

Community members had voiced concerns about the lack of consistent and accurate messaging, so the task force had suggested diversifying sexual education to not only include topics such as contraception and safe sexual behaviors, but diversifying curricula to include mental health, nutrition, healthy relationships, and self-esteem. By doing so, educators will assist future generations in having full, bolstered knowledge about their bodies, autonomy, self-efficacy, and how to navigate relationships; this will help create a healthy backdrop to sexual relationships to precipitate a reduction in teenage pregnancy, and as a distal result, infant mortality.

Even irrespective of sexual health education, enrollment in schooling for as long as possible can greatly decrease infant mortality, poor sexual health outcomes, and poor educational or employment opportunities. “Infant mortality is greater for blacks than for [whites and Hispanics]; this racial difference is...greater among high school dropouts than among mothers who have at least completed high school”

(Cramer, 310). Education, along with low maternal age, African-American ethnicities, unwed mothers, and mothers of low socioeconomic status, is commonly observed as a factor in groups at the highest risk for experiencing infant mortality. As discussed before in this paper, many of these factors may overlap or act simultaneously to precipitate infant mortality: a low maternal age is parallel to fewer years of education and single motherhood as high school age adolescents are those dropping out of the educational system to have children and marriage increases with age. The state of Ohio has already taken steps to improve education and graduation rates by strengthening career-technical programs and, to the extent possible, reducing financial barriers for post-secondary education.

Japan's education system, like the United States, has mandated classes five days a week; it differs in how it responds to and promotes usage of free time by offering optional classes and extracurriculars on Saturdays and deterring students from pursuing part-time jobs. Child welfare facilities and centers operate on different schedules to grant students latitude and opportunities to explore their interests and gain experience. This produces three divergent results: not only does it allow students to be more engaged and involved with their education, but the practices also occupy their free time, such that there is minimal time for sexual exploration and risky sexual behavior, and girls are more empowered and health literate to understand their bodies and their autonomy. Adolescent girls and women in Japan also delay marriage and childbearing in order to advance their education pursuit or career advancement. Engaging girls with their education and prioritizing their career through the reduction of financial barriers and more diverse technical educational paths will help their sexual health outcomes on an individual scale, but will also have positive implications on a societal level through the resulting reduction in infant mortality and economic growth and prosperity from having more educated and professional women in the workforce.

IV. Addressing factors within the youth population to avoid a negative life course that precedes adolescent

pregnancy and poor pregnancy outcomes

Factors that prevail within the youth population and result in a negative life course are often correlated to those that precede poor health and pregnancy outcomes. Because many of these influences are distally related to infant mortality, their focus will parallel many of the other conclusions and recommendations as the life is the aggregate of the opportunities and resources available or unavailable. Neighborhoods can have a direct or indirect impact on individual behaviors and health through the access they enable and the capital they provide; historically in the United States and Columbus, African-American women, women with low education levels, and unmarried women are at the greatest risk for infant mortality, and are often

overrepresented in low-income and disadvantaged neighborhoods. Neighborhoods have a cumulative effect, in that the inequities and social determinants they foster accumulate over the life course of the mother, even prior to the pregnancy, and the infant. The equitable distribution of health protective factors is also lacking in Japan, although their health system and education creates a more even playing field; curiously, though, their lack of an emergency obstetric system and inability to be contacted outside normal business hours makes this medical care inaccessible for everyone, regardless of their prenatal care or insurance level. However, Japan's required reporting of pregnancy at local municipal offices allows public health and medical professionals to document and assess local pregnancies as they are distributed throughout the community. This also presents the ideal location to introduce pregnant women to various interventions and health messages, like the suggested smoking cessation programs. The Columbus public health system can translate this by monitoring all reported pregnancies in hospitals and health clinics and initiating various health interventions and further examining at-risk women.

V. The introduction of community health workers in the poorest and most disadvantaged ZIP codes

In nearly all cultures, the use of community health workers, health coaches, *promotoras*, patient navigators, *Aiiku Han Ins*, and their multitude of other titles, have been shown to ameliorate poor health outcomes and increase participation in the medical institution. Community health workers liaise between doctors and patients and can help them adopt healthy behaviors, while also build their confidence to seek out and navigate the health system. In Japan, the *Aiiku Han* are neighborhood housewives and volunteers that focus on pregnancy-related health education and encourages enrollment in prenatal care and other practices. By focusing on the promotion of health and welfare before, during, and after pregnancy, mothers have more knowledge and confidence concerning health issues and engaged in more health-seeking behaviors. At the same time, engagement with community maternal and child health workers increased the support and involvement from family members and engaged families have been shown to decrease the stress experienced by the mother during pregnancy and after birth. When women feel more empowered, they take control of their own health and prioritize their nutrition, healthy lifestyles, and health literacy and translate this knowledge to become community leaders and disseminate this information to other women and thus, proliferate the work of community health workers.

Tokyo Recommendations

I. The introduction of geographic and spatial analysis and more consistent analysis along socioeconomic lines

Franklin County's expanse of literature, research, and advocacy has allowed scientists and sociologists to develop analysis of infant mortality, risk factors, and social determinants on a geographic basis, such that the discovery of faults in public health, interventions, or foci of various government departments and the gaps in such resources. Japan as a whole and Tokyo in particular have a lack of medical information distilled on a geographic basis and, because their health and environmental ministries publish health information and statistics very generally or by a specific demographic characteristic, it is difficult to discern where there is a gap in information or access; especially when the healthcare system is stretched more and more thinly across the nation, rural health centers have limited resources to provide both inpatient and outpatient services as they often are and have been required to do so; this issue is only complicated by the predominant cultural viewpoint that medical work is sacred and that physicians should be available for all of the patient population's needs.

The Health Policy Institute of Ohio has created various initiatives and solutions in response to gaps in services as discovered through this geographic research, such as the need to "connect the disconnected" to transportation, educational resources, jobs, and social support. Japanese health professionals and advisors can use the spatial topography and keys developed by Jason Reece and David Norris, through the Institute for Population Research at The Ohio State University, to conceptualize data from health outcomes, health services, risk factors, programmatic systems, and social determinants throughout the most underrepresented and socially disadvantaged communities in and around the city. In Tokyo, they can use these studies to track health outcomes and how rapidly they are improving inter- and intra-prefecturally. Geographic analysis can facilitate efforts by *Aiiku Han* volunteers and more easily track or evaluate their triumphs. Beyond the health sector, examining data on sociological grounds can track where and how poverty is exerting its greatest impact and how to improve it; this will distally improve health outcomes as poverty, along with its correlates like stable housing, access to nutritious foods, can have negative implications for women and children.

II. The condensation of important healthcare and social support information for rural and hard-to-reach pregnant populations, while expanding the emergency obstetric care systems

Similar to the recommendation for Columbus, Ohio, Tokyo would see short- and long-term benefits from the consolidation of healthcare and social support information, especially for rural, hard-to-reach, or otherwise isolated and pregnant women. Part of this will stem from and overlap the geographic analysis introduced and conducted in the municipality in order to understand and explore specific characteristics and factors behind hard-to-reach populations as to what makes them hard to reach. Education and

advocacy continue to be inadequate about the public social security and support for information-disadvantaged people are isolated and cannot access public services. At the same time, it is important and pertinent for the Japanese health system to expand their emergency obstetric care system, and access to resources outside of the normal work day or during holidays, as women and infants, regardless of their insurance coverage and location, may need this widened availability throughout their pregnancy and in the postpartum period. Japanese physicians, as they have intimate relationships and knowledge of their patients -- due in part to the overutilization of the system -- will serve as a great resource to track and access isolated patients, which can be mapped through the mandatory pregnancy reporting in the local public office. Conversations about which practices and policies offered within the healthcare domain are most important will allow everyone engaged with the sector -- from policymakers to medical professionals to mothers -- be on the same page and feel equipped to move forward. The Japanese government assesses and researches health disparities between socioeconomic classes and measuring disparities in healthcare access between prefectures has been a goal of the national health promotion strategy since 2012.

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